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HEALTH DEPARTMENT
OF THE CITY OF BOSTON

REPORT

OF

MILK INSPECTOR

FOR THE YEAR 1909-10

[Reprinted from the Thirty-eighth Annual Report of the Health Department]

CITY OF BOSTON
PRINTING DEPARTMENT
1910

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REPORT OF MILK INSPECTOR.

Bureau of Milk Inspection,
30 Huntington Avenue, Boston, Mass.

To the Board of Health:

Gentlemen,— I have the honor to submit the following report for the year ending January 31, 1910:

The total number of samples collected and examined was 22,353, as follows:

Number of samples of milk from wagons	8,137
Number of samples of milk from stores	5,977
Number of samples brought in by citizens	256
Number of samples of milk (bacteriological)	6,344
Total milk samples	20,714
Number of samples of vinegar	851
Number of samples of butter, cheese and oleomargarine,	788
Total samples	22,353

In point of number of samples examined the work performed exceeded that of any previous year. In 1908, 21,023 specimens were tested; 1909 thus indicates an increase in examinations to the number of 1,330, the total for the year being 22,353. The income was, furthermore, larger than that of any preceding year, the fines ($7,162) and license fees ($2,513) aggregating $9,675, an increase of $1,968.50 over 1908.

Much of the difficulty from milk which does not comply with the standard, as has been previously pointed out, is attributed to the careless methods of shopkeepers in neglecting to mix the milk at such times as sales are made. This negligence results in an uneven distribution of the cream upon the milk as sold, some customers receiving richer milk than others. Samples collected after milk has been handled in the above careless manner are often deficient in fat. Efforts have been made to call the attention of shopkeepers to this matter and with some degree of success; it is evident, however,

that at many stores the necessary diligence is not maintained. Such mixing is desired at all times, so that each customer may receive standard milk, and also to prevent these frequent violations of the law.

It is believed that the milk law of this state, with its low fat standard of 3.35 per cent, is not conducive to good milk supplies, as it is possible under this requirement to carry on systematic tampering, namely, that of adding skimmed milk, or by partial removal of cream. Manipulated in this manner handsome profits may be obtained. These possibilities should be carefully considered by those advocating lower standards.

Despite the fact that there were several shortage periods when it was either difficult or impossible to procure an adequate supply of milk, the product as a whole, on its arrival here, was of fair quality from the chemical standpoint. The matter of supplying sufficient milk at times when the demand exceeds the normal supply, as well as that of handling the excess of product when the quantity used falls below the average, is both perplexing and expensive to the dealer. Milk brought here at times of shortage from other than usual sources is likely to be below the average quality, and it is a condition which it is not feasible to regulate strictly.

The large number of cases of watered milk in the last two years indicates that this form of adulteration is being practiced by an increasing number of producers and dealers. It is reasonable to assume that the large amount of discussion given this subject at legislative hearings and elsewhere has left an impression in the minds of those looking for such opportunities that small amounts of water could not be detected when added to milk. If this assumption is correct, the results of 1908 and 1909 indicate that many are overstepping the bounds of safety.

The efficiency of the Bureau in behalf of clean milk has been greatly increased by having, as far as possible, oversight of the supply in other respects than that of procuring and examination of specimens. To a great extent this work was carried on in connection with the daily collections, but notwithstanding this fact it has been attended with good results, and has produced an alertness in those milk handlers specifically dealt with which it is believed will mean better sanitary conditions and more care on the part of these individuals in the future. Re-examinations of the premises of these

dealers have shown that a majority of the latter are endeavoring to right past faults and free their shops from objection.

In this effort a variety of issues have been dealt with, as will be noted by the partial list appended.

Dirty or dusty store; dirty ice box, milk cooler and dipper; unclean cans in stores, and cans in the same condition being returned to cars by milkmen; milk can kept outside ice chest; spitting on floor of milk room; use of milk bottle for brass polish; sour milk tank; pigeons in cow stable; flies and bad odor in milk room; improper testing of milk by tasting; uniced milk being used for school children; sale of milk unlicensed; contamination of milk by dirt from the hand; exposure of opened cans of milk in ice chest employed for other commodities, and sale of condensed milk diluted with water as milk.

From this list, and in view of the many dealers in the city, it will be seen that a large force of men would be required to deal with this problem with any degree of adequateness; it would also entail never-ending oversight.

License Law.

A new license law was adopted in 1909, and by this act it became necessary for shopkeepers, as well as milkmen, to renew their permits annually. Under the old law storekeepers were given licenses which held good as long as business was conducted by the licensee at the place originally licensed. With the present arrangement there is the advantage that a corrected list of dealers is possible at least once a year. This feature is of value, for the ownership of many of the small places is constantly changing.

The labor entailed by this law, however, was enormous, as it involved, in addition to new applications and licenses, a complete revision of the card catalogue and much other detail which is necessary to keep a proper check upon dealers. Practically all of this work was done in the months of July and August, and that it was carried on with the usual routine and with nominal expense for outside help reflects most creditably upon the assistants in this Bureau. In the two months above mentioned 3,070 licenses were actually issued, in addition to receiving and handling applications for many other permits. The income from this

source was greater than that of any previous year in the history of the office, and is probably larger than that possible in any single year of the future under the present law. All of the hotels and many other places not previously licensed applied for permits under the new act. One firm denied the contention of the Bureau that the law applied to hotels, but the legal action which resulted was decided in favor of the government.

There is one phase of this license question in its relation to milkmen which requires consideration and that is that with the present concentration a few dealers use many wagons in their business, and for this privilege pay a fee of only 50 cents. Formerly there were over 700 dealers licensed annually to sell milk from wagons in this city, and rarely did a single milkman operate more than one wagon, the price of the permit at that time being the same as now. At the present time, however, some dealers use about forty wagons daily in their business and eight firms operate 196 wagons, or 38.4 per cent of the vehicles employed. Under these circumstances the conditions in vogue at the time of the passage of the first license law no longer exist. It would therefore seem advisable to change the license fee for milkmen, so that those doing a considerable business should either pay a larger fee or a stated sum for each wagon which they operate. If the latter plan was adopted it would be necessary for each wagon to have a distinctive license number.

The following list gives the dealers operating one or more wagons:

143 firms use 1 wagon each.
46 firms use 2 wagons each.
10 firms use 3 wagons each.
6 firms use 4 wagons each.
5 firms use 5 wagons each.
1 firm uses 8 wagons.
1 firm uses 9 wagons.
1 firm uses 19 wagons.
1 firm uses 21 wagons.
1 firm uses 25 wagons.
1 firm uses 35 wagons.
1 firm uses 38 wagons.
1 firm uses 41 wagons.

Number of Milk Dealers and Quantity of Milk Handled Daily.

With the exception of 1908, there has been a constant decrease in the number of milkmen and this can be partially attributed to the changed methods of conducting the business. Some of the older dealers also dispose of their trade each year and usually sell to

other milkmen; experience has demonstrated that not many new firms engage in the traffic. In 1909 there were only 275 licensed milkmen, and this is the smallest number yet registered. During 1908 there were 294 licensees. A decrease in the number of shops selling milk is also to be noted; there are now 3,692 of these licensed establishments. In 1908, 3,749 such places had permits to sell milk.

The amount of milk handled daily in Boston was greater than in 1908 by 29,452 quarts. The amount dealt in each day in 1909 approximated 364,976 quarts. Of this quantity about 327,930 quarts arrived by railroad, but a considerable quantity of this milk was sold in nearby cities and towns. Boston's consumption of milk also increased about 7,865 quarts daily by comparison with the amount used in 1908. The decrease in the employment of milk as a food reached its maximum in the closing month of 1907 and in the winter months of 1908, and was partially due to an increase in price which occurred in October, 1907. Since the early summer of 1908 this lost trade has been gradually recovered, and the large dealers report for 1909 an increase in business. About 244,386 quarts of milk were consumed daily in this city in 1909. Of this amount 207,340 quarts, or 84.84 per cent, came here by railroads; 32,310 quarts, or 13.22 per cent, were conveyed by wagons; and 4,736 quarts, or 1.94 per cent, were the product of the 520 cows kept within the city limits. The sale of milk transported by wagons, the most of which was produced in close proximity to the city, indicates a daily increase of 1.82 per cent; a decrease of 1.53 per cent in the use of milk transported by railroads is denoted, and the production of milk within the city boundaries was less than in 1908 by 0.29 per cent.

Certified and Inspected Milk.

The demand for milk of the higher grades is constantly increasing, and while this is an encouraging condition it is the logical outcome of the educational propaganda which is essential to attempts at obtaining improved milk supplies. This is an indication that consumers are being aroused to the importance of this issue and that the proportion of those willing to pay for clean milk is surely, even if slowly, growing. While

the number of people who view the matter in this light is not as large as could be desired, it is not surprising that it is no greater, considering the fact that only a few years ago practically everyone judged of milk solely on the cream line basis. It is only within a comparatively short time that healthy stock, cleanliness, freshness and proper care have been deemed the essentials for good milk supplies. The production of milk on this latter basis is an expensive undertaking in which the consumer must be a partner from the cost standpoint. This last issue has been the principal drawback in enlisting the support of milk users. Fortunately progress in the right direction is now being made, as consumers are beginning to realize that in the purchase of milk, as with other commodities, the rules of common sense and trade must be followed, namely, that if an article of superior quality is desired the consumer must bear the expense. It is necessary from the health standpoint, however, that this doctrine be applied to all purchases of milk, whereas with many other commodities the decision as to cost and quality may be decided from other standards less essential to community welfare.

There are now five dairies supplying Boston with certified milk, one dairy having been added during the year. At present the daily demand is for about 1,032 quarts, which indicates a considerable increase over the amount sold a year ago. This output could be materially increased whenever the demand becomes sufficient; in fact, there is and has been for a long time a surplus of this grade of milk. With a population of the size of this city this condition should not be possible. The quantity of this milk consumed amounts to only 0.42 per cent of the daily supply. This milk is produced under the supervision of a medical milk commission, and the health of the cows, the conditions, surroundings and handling methods are as nearly ideal as it is possible for human oversight to provide. This type of milk has less than 10,000 bacteria per cubic centimeter.

The use of milk which might be classified as inspected has also increased. Much of this is produced under the supervision of another medical commission and the conditions, while not as stringent as for certified milk, are to be commended. This product is much cleaner than ordinary milk and should not have more than 100,000 bacteria to the cubic centimeter. Some of the large

FIG 1.—MILK DIPPER IN ACTUAL USE WITH SEAMS CORRODED WITH SOUR MILK. SUCH A DIPPER WOULD QUICKLY SPOIL GOOD MILK.

dealers have recently placed upon the market brands of milk which are of the quality of the inspected variety, which is guaranteed only by the firms selling the milk. Much of this milk is from cows found to be free from tuberculosis by the tuberculin test. Plans have been perfected for increasing the output of this brand of milk whenever the demand warrants such action. Approximately 10,580 quarts of this milk are now used daily.

The physician can play an important part in educating the consumer concerning the value and benefits attendant upon the use of clean milk; furthermore, the unselfish efforts of those physicians who have assisted in providing these supplies ought to be actively supported and encouraged by the members of the profession. There should be a dearth rather than a surplus of clean milk. The consumer's welfare, his intelligence and good judgment should make this the paramount condition.

Heated Milk.

Two of the companies engaged in the sale of this commodity have made changes during the year in their methods of treating the milk. Holding devices have been installed by these concerns, and one firm heats the milk to a temperature of 145 degrees Fahrenheit and then it is placed in a holding device, where it remains about thirty minutes, during which time the temperature remains practically constant. The other concern brings the milk to a temperature of 160 degrees Fahrenheit and then holds it at approximately this temperature for thirty minutes. Another company is equipped with a modern pasteurizing outfit, making in all three firms which are treating this form of milk according to approved methods. One firm which does a considerable business is using the continuous process for heating, the temperature employed being from 145 to 150 degrees Fahrenheit; and a fifth company also utilizes the continuous process, but heats the milk to a temperature above 155 degrees Fahrenheit. The quantity of heated milk sold has not materially changed from that of the previous year. Approximately 75,000 quarts are consumed daily. This amount is 30.68 per cent of the total supply. About one-fifth, or 15,083 quarts, is sold under proper conditions, *i. e.*, delivered to consumers in bottles; the remainder is

sold in cans. Experience has shown that heated milk should not be handled in cans, as it then, in the ordinary course of business, undergoes change more readily than when contained in bottles. This treated milk, as indicated in previous reports, ought to bear a label upon which should appear a statement as to the temperature employed and the date when it was heated.

Further information concerning heated milk appears under bacteriological examination of milk from wagons and stores.

Milk Cans.

As all of the milk cans sent into the country daily are now returned washed, the opinions of contractors as to the influence of this change upon the milk supply is of interest. The verdict from all but one firm, and based upon experience of from two to four years, is that the cleansing of cans here has been a factor for improvement, and that the opportunity for milk becoming contaminated at the dairy is greatly reduced. One contractor holds the opposite belief and contends that milk arrives from the country in better shape when the cans are cleaned by the farmer in the country. The weight of the evidence, however, is sufficient to combat this individual claim. There can be no doubt as to the cans being better cleaned under the present plan than that formerly in vogue, where the work was delegated to thousands of dairymen, many of whom were poorly equipped for the service. The great drawback with the present arrangement, as indicated in previous reports, is that some farmers insist on filling the cans regardless of their condition. Such an attitude is wholly wrong; if a can does unintentionally go from here not properly cleaned no dairyman should make use of such a container without cleaning it. An obligation which should not be shirked rests upon every one engaged in supplying milk to consumers; this applies to the farmer in the country as well as to the city dealer.

The substitution of the $8\frac{1}{2}$-quart can for those of a capacity of $21\frac{1}{4}$ quarts and larger sizes, for transporting milk from the country, continues. Two firms still cling to the small can to a considerable extent and assert that they are much better liked, by reason of being easier to handle, both empty and filled, than those of larger capacities. With those who believe larger cans advan-

FIG. II.—THE TOP OF THE MILK TANK WAS FOUL FROM MILK SPLASHINGS. NOTE THE MOULDY CAN STOPPER ON SHELF ABOVE TANK.

tageous the substitution has been largely towards cans holding $21\frac{1}{4}$ quarts. Two firms prior to 1909 replaced all of their cans sent to the country with those of this size. During the last year one concern substituted these cans on two cars for those holding $8\frac{1}{2}$ quarts; another company is now transporting one-half of its supply in $21\frac{1}{4}$-quart cans. The continued increase in the employment of this larger can unit demonstrates that this substitution is proving advantageous to the supply.

The era of the wooden milk-can stopper is rapidly disappearing. In the delivery of milk about the city one firm in 1908 began the use of a can holding $8\frac{1}{2}$ quarts, closed with a cap like a milk bottle. These cans had to be made with a special neck with a rim or lip for holding the cap, the latter being much thicker than the ordinary bottle cap. This experiment proved successful, although the can is not without faults. Besides doing away with the insanitary wooden plug, it keeps the milk in much better condition and has certain advantages from the economic point of view. Less repairing is necessary with this type of can than with those with wooden stoppers, and the cost for caps is less than that for the wooden stoppers and the necessary washing of the latter. About 1,600 of these cans are used in the city daily, and all of the $8\frac{1}{2}$-quart cans ordered by this firm last year were of this type.

Misuse of Milk Containers.

The practice of using milk vessels for other purposes than for holding milk is deep rooted and not easy of eradication. Practically all of the instances of misuse brought to the attention of the Bureau during the year were for wrongful employment of milk bottles. These were being utilized for a variety of purposes, some as containers of substances like jam, molasses, coffee, vinegar, beans and brass polish (oxalic acid being one of the ingredients of the latter). This partial list, coupled with the substances reported in previous years as having been found in bottles and cans, shows that these receptacles have been employed for a great variety of purposes, and the continued misuse after the efforts of the last few years indicates that the habit with many people is firmly fixed. Much of the illegal use was found to be with the keepers of small shops, very few of whom could honestly claim ignorance of the require-

ments, as they have all been supplied with printed copies of the law and regulation upon this subject, together with a printed card for posting in places of business, which emphasizes the fact that misuse of milk containers is contrary to law. In addition to this all applicants for milk licenses at this Bureau have an opportunity to see an exhibit of misused containers, which is intended, and which is of the type to teach the lesson that such employment is not only contrary to law, but opposed to good milk supplies. Despite these attempts at prevention, intentional and heedless violations continue.

It is gratifying to note, however, that much of the misuse of milk cans seems to have ceased. Formerly there was much trouble on this score, but the difficulty was mainly confined to large business firms doing business as restaurateurs, bakers, etc., many of whom have now equipped their establishments with other utensils to take the place of milk cans. Instances are occasionally noted where cans are used for cooking purposes. These are usually very difficult to clean, and the heating ruins the bottoms of the cans.

The success of the Bureau in dealing with this misuse problem is encouraging, in view of the fact that it has been carried on without any increase in force and practically unaided. Milkmen have it in their power to render material assistance, but help from this direction has been a minus quantity. Lack of courage and the fear of losing customers have been responsible for this policy on the part of the dealers. The help of the latter, by way of observation of such of the containers as are returned to them, would be useful to the Bureau in its efforts to better the milk supply through the condition of the cans. As pointed out in the report for 1908 milkmen could immediately stop to a large degree the improper use of milk vessels. If they would keep an effective check on their cans and bottles, collect them promptly and charge customers for all vessels not returned, then the misuse would promptly cease, as in the absence of the cans and bottles temptation to break the law would be lacking. Fear of loss of trade is responsible for the nonadoption of this correct and feasible policy.

The large firms are practically unanimous in the belief that the misuse of milk vessels has decreased. One concern has given the subject especial attention

FIG. III.—A TYPE OF DIRTY STORE.

and has noted a decided improvement. While the offenders of this law are not confined to one district, it is a fact that more violations have been detected in the West End than in any other section of the city.

A large number of cases were brought to the attention of the courts for violation of this law, and it is believed that these actions will have a salutary influence in lessening violations.

Cleaning of Milk Vessels.

The regulation of the Board of Health relating to the cleaning of milk cans and bottles as soon as emptied by consumers and dealers has also been beneficial, and many milk vessels are being returned to milkmen in much better condition than ever before. In the manner in which this regulation contemplates that milk vessels shall be used after emptying by consumers and shopkeepers, subsequent thorough washing is simplified, consequently there is greater assurance of their being clean before being again employed as containers of milk. Notwithstanding this fact some milkmen were opposed to the regulation and viewed it as an interference with their customers. Foundation for such objection is, however, not based on sound principles, as petty trade considerations are of minor importance beside that of improving the quality of milk as delivered to consumers. Observation of the state in which containers were formerly returned to milkmen, especially in summer, would indicate to an unbiased person that there was an opportunity for improvement. Cans upon which milk has dried, or in which milk has decomposed until it is moldy, maggoty, or has the characteristic and offensive odor of this product in its rotting state, are not conducive to good milk supplies. Foul vessels breed contempt and carelessness towards sanitary milk, and the proper spirit can be engendered in those engaged in its sale only by insisting upon thorough cleanliness at all times.

In a sense the unbusinesslike methods of milkmen were responsible for the regulation, for if the containers had always been collected promptly the opportunity for their becoming offensive would have been materially lessened. Control of property, especially of milk containers, is best vested in the owners. Consequently prompt collection is urged.

The efforts put forth to bring this can-cleaning regulation to the attention of shopkeepers and others, together with the cases of violation presented to the courts, are having the influence desired, and better results are anticipated in the future.

All of the contracting firms but one report that a decided improvement is noted in the condition in which cans are now being returned to them. Some of the latter have materially assisted the Bureau in acquainting their customers with the provisions of this regulation, and they report that it has been of great benefit to their supplies. The regulation, to a certain extent, has aided in reducing the number of misused cans.

Regulation Adopted by the Board in 1909.

During the year the Board of Health adopted an important regulation which dealt with the sale of milk in bottles by shopkeepers and also prohibited the mixing of water with condensed or other evaporated milk and the subsequent sale of such diluted products.

Undoubtedly the worst milk in the city is that sold in shops, and although there has been a marked improvement in this shop milk since 1905 the adverse conditions are so numerous that the desired success cannot be hoped for under present handling methods. In addition to being the least desirable from the standpoint of age, there is the possibility of contamination not only from the numerous handlings and necessary utensils but also from the vast number of human beings (shopkeepers and attendants) required for its sale by the existing plan. Despite care and effort, many shopkeepers are not as clean in their care of utensils or in other respects as they should be, and to maintain proper oversight in the many places where milk is sold would entail an unwarranted expenditure for assistance. The crocks used for holding the milk are not given frequent and efficient cleanings, the seams of dippers are allowed to become foul from decomposed milk, and in measuring out the milk when sales are made the containers brought by purchasers are held over the tank, so that drippings flow down the outside of these containers, washing off any dust into the crock below. Not infrequently these drippings also flow over the fingers of the operator as the container is held over the crock. Such procedure is always at the expense of the quality of the milk, but

FIG. IV.— DIRTY STORE AND DIRTY ATTENDANT. UNSTOPPERED CAN OF MILK OUTSIDE ICE CHEST.

these objectionable methods have become habits with many shopkeepers and complete eradication is difficult if not impossible.

The shop surroundings are oftentimes objectionable, even where the utensils receive proper care. In some places, however, the undesirable conditions are found only occasionally, but persistent inspection would undoubtedly fail to keep all stores free from offensive environment.

The present idea of granting licenses is partially responsible for many of the undesirable features governing the sale of milk in shops. The personal equation should be the factor in judging of fitness to deal in this commodity. Fortunately this element was recognized by recent legislation and "suitable persons" only should be given licenses. Permission to deal in milk must be viewed as a privilege and not as a right, and promiscuous licensing should be stopped. Until greater discrimination in dealing with individuals is permitted no method of handling milk will be entirely free from objection.

Consideration should also be given to the fact that the majority of shopkeepers, probably 90 per cent, do not desire to sell milk, and that they deal in it only as a side issue, as an accommodation to customers and because it is sold by their competitors. Many are influenced to engage in the traffic because of this latter reason, as customers will as a rule purchase other commodities at stores from which they obtain milk. Furthermore, the bulk of shop milk is handled at no profit to the vendor, who frequently finds the dipping out of small quantities of this product troublesome and annoying.

There is no doubt that many storekeepers would abandon the sale of milk immediately if they could retain their trade in other commodities and not give competitors a business advantage. No just reason exists, however, for every store in a group of stores dealing in milk; one milk-serving shop could better supply customers than under the present plan. Where shops sell a large amount of milk it has been found that it is usually handled under better conditions than those ordinarily found at stores dealing in one, two or three cans ($8\frac{1}{2}$ quarts each) daily.

There are additional reasons why shop milk is likely to be of poor quality, and why storekeepers give this branch of their trade only the attention which they are

compelled to do. To illustrate some of the undesirable conditions likely to be found at shops under the present arrangement for selling milk the following photographs are reproduced:

Figure I. This shows a milk dipper found in the milk tank of a store, the outer portion of the latter being shown in the picture. The seams and rim of this dipper were corroded with sour milk and milk fat, and had every appearance of not having been washed for many days. Some of this material, when scraped from the dipper and examined, was found to contain bacteria which would be the equivalent of 8,470,560 to the grain. This store was fairly clean.

Figure II. Figure II. is that of a shop where the general conditions were poor, the floor was dirty and merchandise was scattered about in a disorderly manner. The top of the milk tank was moldy and darkened from decomposed milk splashings, and the resulting odor was indescribable. This cover would quickly spoil milk kept within the tank.

Figure III. This represents a basement store which was not only found untidy but the floor was in process of being swept, and at the same time the cover of the milk tank was open. The place was crowded with merchandise, which was evidently not being given any more care than the milk. A dipper with sour milk in the seams was found in this place. One grain of this material contained 3,333,300 bacteria.

Figure IV. A slovenly establishment with much to condemn and little to commend. Even the attendant and the hair of the child showed the result of neglect. The actions of the latter demonstrated the condition which existed. The unstoppered can of milk was found outside of the ice chest; it was half full of milk. Because of continuous evidence that milk was being handled with lack of care the license at this place was finally revoked.

Figure V. This is a store where the conditions have not always been faultless. The picture illustrates the manner by which milk may be contaminated by the drippings from the measure running over the outside of vessels brought by customers and into the tank below.

Figure VI. Figure VI. represents a store of the undesirable type, and illustrates the filthy habit of permitting milk to come in contact with the hand during the process of measuring.

Figure VII. A clean store, which is given careful oversight by proprietor and attendants, but nevertheless the tank was found in such a condition that milk could not be dipped out readily without the fingers of the operator coming in contact with the milk. This was caused by the tank being so full of milk that it came nearly to the top of the dipper handle.

Figure VIII. The picture is that of a small store where milk is sold in bottles and kept upon ice in the ice box. The bottles

FIG. V.—THE DIRTY METHOD. ILLUSTRATES THE FLOWING OF MILK OVER DIRTY CONTAINER BACK INTO THE TANK.

were raised from the chest for the purposes of this photograph. In addition to handling milk in a commendable manner the general condition of the place was beyond reproach. Contrast the orderly arrangement of stock with the shiftless methods of the owners of the stores shown in Figures II., III., IV., V. and VI.

Not many would care to feed infants with milk obtained from establishments such as those shown in Figures I., II., III., IV., V., VI. and VII., and yet as long as these stores exist there is every probability that some of the milk is so used. By reason of all of these facts the Board of Health decided to compel all shops dealing in milk to be consumed off the premises to sell the same in bottles or other tightly closed receptacles. This order has met with opposition on the part of some milkmen, but has found favor with practically all storekeepers, who view the project as a partial relief from some of the cares and responsibilities under which the shop sale of milk is now conducted. An earnest compliance with the regulation upon the part of all dealers cannot fail to be followed by marked improvement in the supply.

The remaining portion of this regulation was to prevent the wholesale dilution of condensed milk, which was being carried on here, and the subsequent sale of the diluted product as milk. This condensed milk was made in Vermont, and after being brought to this city was mixed, one part with three parts of water, and then sold for whole milk. Cases were brought against the company selling this diluted product, under the law prohibiting the addition of water to milk, but the actions are still pending in the Superior Court upon appeal. The defendants in these actions contend that the product to which the water was added was not milk. These prosecutions and the regulation put an effectual check upon the business, and none of the diluted product is now obtainable.

This regulation follows:

Section 1. No person or corporation shall sell or offer, expose or keep for sale in any shop, store or other place where goods and merchandise are sold, milk or cream, unless the same is sold or offered, exposed or kept for sale in tightly closed or capped bottles or receptacles, which have been approved by the Board of Health. Nothing contained herein shall prevent the sale of milk or cream from cans, crocks, coolers or other receptacles in restaurants or hotels, when the milk or cream is

to be consumed in the restaurant or hotel by guests or patrons ordering the same. This section shall take effect June 15, 1910.

SECT. 2. Every person or corporation engaged in the business of selling milk or cream shall, immediately upon receiving a written order from the Board of Health so to do, comply with any requirement of said Board respecting the filling of milk and cream in bottles or receptacles, the manner and methods employed in such filling or the conditions and surroundings under which such filling is done and carried on.

SECT. 3. No person or corporation shall sell or offer, expose or keep for sale at retail milk or cream in the room or store where the same is put into bottles or receptacles.

SECT. 4. No person or corporation shall mix for purposes of sale two or more of the following substances: Whole milk, skimmed milk, condensed milk, concentrated milk or evaporated milk and water. No person or corporation shall sell or offer, expose or keep for sale, deliver or have possession or custody of with intent to sell, mixtures of any of the substances named above. Nothing contained herein shall prevent the preparation and sale of "modified milk," when sold as such, to be used as food by infants and invalids.

Sections 2, 3 and 4 shall take effect August 1, 1909.

INVESTIGATING COMPLAINTS.

Each year brings an increase in complaints from citizens, thus indicating that the number of people interested in milk and other products is being constantly augmented. A large proportion of these are from individuals concerned in the quality of milk from the chemical standpoint, and many of these latter are anonymous. It is interesting also to note that more consumers are annually manifesting solicitude as to the sanitary methods employed by milkmen and shopkeepers, and an awakening of this nature is most encouraging, for with users actively aroused regarding these subjects the necessary support to the clean milk movement is assured.

The Bureau is always ready to render assistance in these matters and every complaint, regardless of the manner in which it is made, is investigated whenever it is possible to do so. While many of these objections are found to be unwarranted, and this holds particularly true with those relating to milk being deficient in milk solids or fat, there are numerous instances where the information has not only been well founded but of much service to this office in its efforts to have the products of which it has oversight of good quality and handled in a sanitary manner.

FIG. VI.—THE FILTHY METHOD. ILLUSTRATES HOW ATTENDANTS PERMIT MILK TO COME IN CONTACT WITH THE HAND DURING MEASURING.

That the various matters brought to the notice of the Bureau were varied in character is shown by the partial list which follows:

Milk being sold which was skimmed or watered; persons sleeping in rear of room in which milk was sold; improper testing of milk by tasting; vinegar below standard; sale of butter alleged to have an odor of cow manure; use of milk cans for eggs; dirty stores; use of oleomargarine in charitable institutions; milk being sold which sours rapidly; unclean milk room; use of dirty bottles and fly-specked caps; milk tank foul and dirty; sale of milk at unlicensed places; dirty attendants and dirty children in store; person with tuberculosis sleeping in rear of store; insanitary dairy conditions; and sale of milk with a high temperature.

Much time has been devoted to the investigation of these subjects, and especially is this true where insanitary conditions were found. The returns from the efforts have usually been of lasting value, however, and in most instances there was ready compliance with the suggestions which were made. The interest of citizens in these matters is both a healthy and helpful indication.

Dairy Inspection.

The work of 1909 with respect to dairy oversight not only exceeded that of any year in the history of the Bureau, but in point of numbers was in excess of the combined work of other years. This has involved much labor and a vast amount of correspondence, and to keep a proper check on the detail involved it was found necessary to inaugurate a card catalogue system, which has already demonstrated its efficiency. Without this means of checking the keeping of a proper record was difficult and annoying and involved much waste of time. Now the record of a dairy may be readily ascertained by reference to its corresponding card.

Most of the dairies which have received attention during the year were brought to the notice of your Board by reports based upon the inspections of the State Board of Health, which reports were later forwarded to this Bureau. Some of these dairies receiving consideration, however, were inspected by representatives of the Bureau and a majority, though not all of these latter, were at a considerable distance from the city.

Except in instances where it seemed the further production of milk would be a menace to public health, the offending dairies were given an opportunity to get rid of the objectionable conditions. Most farmers took advantage of this plan and have either wholly or partially freed their places of faulty features. Some of the improvements were of such a nature that they could not be instituted advantageously during the cold weather, which is one reason for delay. Later reports are expected from these farms. The majority of these places were not brought to the attention of the Bureau until late in 1909, but 54.63 per cent of the dairies are reported as having complied with the requirements, and 8.25 per cent have either been excluded from this market or milkmen have stopped buying the milk. Responsibility for having changes made at dairies has been placed upon the milk dealers who were purchasing the milk and bringing it to this city, and from these latter reports as to improvements are received.

When it was deemed wise, in the interest of consumers, to exclude milk from a dairy that action has always been taken. The following required changes are typical of some of these places:

"To clean barn and surroundings; clean and whitewash tie-up and put in two additional windows; clean filthy cows and especially their udders and keep them clean; clean and drain yard in vicinity of tie-up and provide a milk room."

At one of these farms entitled to a similar characterization the owner not only refused to put his dairy in a sanitary condition but stated that he would continue to sell milk under such arrangements as he chose to elect. At last accounts the milk from his place was being sold through a milk dealer in the town in which this man lives.

Some of the remaining objections registered against dairies involved enlarging tie-up windows; ceasing to strain milk in tie-up; separating horses from cows by a suitable partition; enlarging tie-up or stop overcrowding cows; discontinue the use of horse manure for bedding; stop cooling milk in trough from which horses and cows drink; lack of ice; removal of pigs and chickens from barn; dirty and foul smelling premises; tie-up used as a privy; and pollution of well from leachings from barn yard.

New England is at a decided disadvantage in respect to its milk supply in the three following particulars:

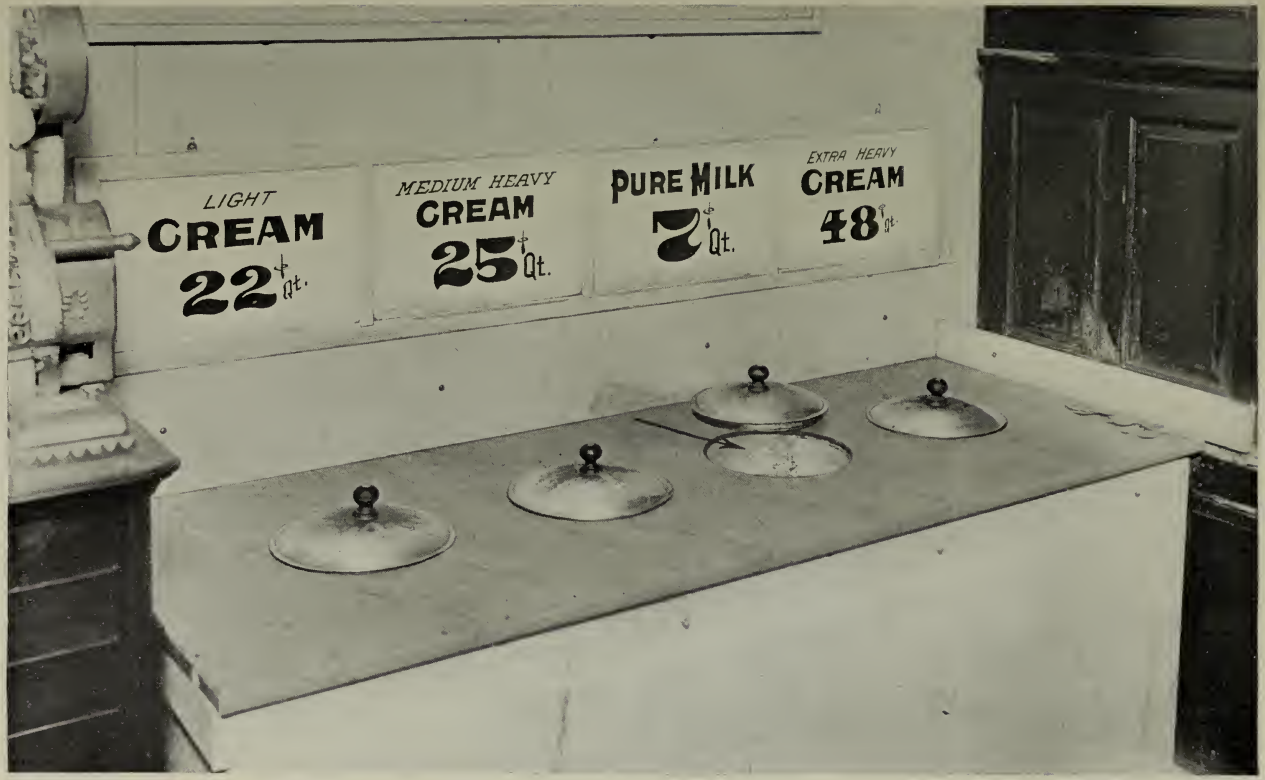

FIG. VII.—NOTE HANDLE OF DIPPER IN MILK TANK. IMPOSSIBLE TO DIP OUT OF TANK WITHOUT BRINGING FINGERS IN CONTACT WITH MILK.

First, the many small dairies from which milk is procured; second, the large number of dairies for an adequate supply, which this condition necessitates; third, the distance from which some of it is transported, the longest haul now being over 250 miles.

The lack of large dairies, then, not only involves procuring supplies from many farms but the bringing of milk from remote and widespread territory. Without these small dairies, however, there would be a milk famine, and so in that particular the condition is fortunate. Small producers do not, as a rule, take the interest in milk raising likely to be shown by farmers with much capital invested in the business, and this fact, coupled with the many small dairies necessary to the supply, renders good dairy conditions problematical and forms a serious hindrance to effective inspection. The distance and great area involved are further factors dangerously nfluencing the best oversight. Without large dairies faulty conditions are likely to predominate, as regulation of small producers is unsatisfactory and will be found to involve a constant expenditure of energy. New England needs large dairies; with these better dairy surroundings and efficient maintenance could be expected and realized.

While distant dairies are objectionable, for the reasons cited above, nearness to market is not wholly without detrimental effect, especially where farms are so near a large city as to make the land too valuable (in the opinion of the owner) to warrant sufficient outlay even to keep a primitive equipment free from criticism. With a condition like that just referred to the owner lives in anticipation of selling his plant, and dairying under modern methods is not likely to be given even remote consideration. At one of these farms, conducted on the run-to-ruin policy, and the owner receptive for a real estate boom, the milk pails, strainer and cooler were found at mid-day outside the barn, unwashed from the morning milking and covered with flies; cobwebs abounded in the tie-up, which was in need of whitewash; there was no milk room, and the milk was strained outside the barn when it was pleasant and inside when it stormed; the well was dry and water had to be brought from a distance; and the piles of manure, which from laziness had been allowed to accumulate, were sufficient to fertilize a large tract of land. This

place was visited in October, and the haying had not at that time been completed. Slovenly as was the equipment it was outclassed by the owner. This dairyman had been urged by the dealer purchasing the milk to institute modern methods, which he refused to do, and also persistently objected when notified by the authorities. For this reason the milk was excluded from this city, and the farmer was compelled to abandon its production.

The work of the year upon dairy inspection cannot fail to have a beneficial influence, not only at the farms directly involved but also upon other dairies and dealers having to do with the supply of this and nearby cities. The work will be continued, with the intention of having the best production surroundings which are possible under somewhat adverse conditions.

Bacteriologic Examination of Milk.

The wisdom of employing the standard for bacteria (500,000 per cubic centimeter) upon an educational basis, and to aid practically in the improvement of the milk supply, was never more clearly demonstrated than by the work of 1909, by which a pronounced betterment was shown. This result has only been accomplished by the persistent policy pursued. The support of many dealers has been enlisted, and the term "bacteria," as applied to milk, has been practically employed to emphasize the necessity of cleanliness, cold and good handling. No doubt this plan has been largely responsible for the efforts to improve supplies, and the necessity for such procedure has been brought to the attention, at least, of every farmer supplying this market with milk.

From the viewpoint of practical utility this work has carried with it the lesson that improved conditions were essential, not only on the part of the producer but also with the dealer and consumer. Thus this standard has been an efficient aid in obtaining better grades of milk, and there has been almost constant improvement since the commencement of this campaign. Such progress has been made that it is time greater discrimination was exercised by contractors and those dealing directly with producers in the selection of sources of supply. All undesirable dairies and those

FIG. VIII.—A NEAT STORE. MILK IS SOLD IN BOTTLES AND IS KEPT IN ICE BOX IN CONTACT WITH ICE.

unable to raise milk with low bacterial content should be excluded from this market. When this is accomplished there will be a firm basis for further improvement of the supply.

During the year 6,344 samples were subjected to examination, which is the highest number yet recorded in a single year. Many specimens were procured from contractors, and these latter were practically all taken at the cars just as the trains arrived from the country laden with milk. From this source 3,786 samples were collected, which is 418 less than the number so obtained in 1908. Warnings to the number of 600 were sent to dealers (milkmen and shopkeepers) in 1909 for milk in which large numbers of bacteria were found; of these, 217 were sent to contractors and by them subsequently distributed to the farmers who produced the faulty milk. The character of the milk obtained from contractors is indicated in Table I.

Table 1.— Bacteriologic Examination of Milk Samples from Contractors. Taken from Cars on Arrival.

Bacteria per Cubic Centimeter.	Number.	Per Cent.
Under 50,000	2,226	58.80
50,000 to 100,000	395	10.43
100,000 to 200,000	537	14.18
200,000 to 300,000	68	1.80
300,000 to 400,000	63	1.67
400,000 to 500,000	66	1.74
Total under 500,000	3,355	88.62
500,000 to 600,000	95	2.51
600,000 to 1,000,000	110	2.91
1,000,000 to 3,000,000	147	3.88
3,000,000 to 5,000,000	38	1.00
5,000,000 to 10,000,000	24	.63
Above 10,000,000	17	.45
Total above 500,000	431	11.38
Total	3,786	100.00

These figures denote a marked improvement over the preceding year, and this is especially noticeable in the

percentage of samples with less than 50,000 bacteria to the cubic centimeter; a further gain is seen in the percentage of specimens below 200,000 bacteria per cubic centimeter. It will be noted that 83.31 per cent of these samples contained 200,000 or less bacteria per cubic centimeter; in 1908 only 77.34 per cent of the specimens were found to have this bacterial content. With milk of this quality, ideal bottling methods and without the long storage to which milk is subjected, it would be possible to deliver milk to consumers containing few bacteria. Table I. indicates that 88.62 per cent of the samples complied with the regulation, while 11.38 per cent contained an excessive number of bacteria.

It will be observed that in this latter classification there are many specimens containing millions of bacteria, and although the number of these is less than in the two preceding years, progress in the reduction of these high count samples has not been rapid enough. The problem must be attacked with greater vigor by those firms chiefly responsible last year for these findings. In the majority of cases careful investigation on the part of the contractor would disclose the cause for these results, which in most instances would be found to be dirt, lack of cooling or the age of the product. If the contractor is at fault in the milk being old he should remedy the condition, while if the trouble rests with the producer through filth or lack of proper care, he ought to be dropped as a source of supply unless he practically demonstrates ability to produce a higher grade of milk. A duty devolves upon contractors and milkmen to thus protect consumers; furthermore, these samples with high count should be detected, and if necessary eliminated, before discovery by this Bureau.

Table II. indicates the character of the milk from the various contracting firms, and with two exceptions the findings are better than for 1908. All of the firms but "D" and "E" showed marked gain. With "D" the decrease from the percentage of the previous year is 2.91 per cent; in the case of "E" the falling off is less pronounced, amounting to only 0.65 per cent. In the matter of samples with 50,000 and less bacteria to the cubic centimeter, there has been, with a single exception, a pronounced gain, "D's" specimens being less by 0.6 per cent; with the other concerns this increase amounted to from 5.61 per cent to 14.56 per cent. The firms

Table II.— Bacteriologic Examination of Milk Samples from Individual Contractors. These Specimens Considered Collectively in the Preceding Table.

Bacteria per Cubic Centimeter.	A.		B.		C.		D.		E.		F.		G.	
	Number.	Per Cent.	Number.	Per Cent.	Number.	Per Cent.	Number.	Per Cent.	Number.	Per Cent.	Number.	Per Cent.	Number.	Per Cent.
Under 50,000	194	70.04	350	61.40	312	65.13	260	48.40	461	60.50	360	52.32	289	61.10
50,000 to 100,000	28	10.11	56	9.83	67	14.00	52	9.68	80	10.50	65	9.44	47	9.94
100,000 to 200,000	42	15.17	84	14.73	70	14.60	68	12.66	112	14.69	93	13.52	68	14.37
200,000 to 300,000	2	.72	12	2.11	8	1.67	11	2.05	14	1.84	14	2.03	7	1.48
300,000 to 400,000	3	1.08	8	1.40	2	.42	13	2.42	13	1.71	14	2.03	10	2.11
400,000 to 500,000	.....	.....	5	.90	6	1.25	19	3.54	9	1.18	16	2.32	11	2.33
500,000 to 600,000	3	1.08	19	3.33	3	.63	13	2.42	22	2.89	24	3.50	11	2.33
600,000 to 1,000,000	2	.72	12	2.11	2	.42	36	6.73	20	2.63	24	3.50	14	2.96
1,000,000 to 3,000,000	2	.72	15	2.63	8	1.67	40	7.45	18	2.36	50	7.27	14	2.96
3,000,000 to 5,000,000	.....	.....	4	.70	1	.21	13	2.42	8	1.05	10	1.45	2	.42
5,000,000 to 10,000,000	.....	.....	4	.70	.....	.....	10	1.86	3	.39	7	1.02		
Above 10,000,000	1	.36	1	.16	.....	.....	2	.37	2	.26	11	1.60		
Total under 500,000	269	97.12	515	90.37	465	97.07	423	78.75	689	90.42	562	81.66	432	91.33
Total above 500,000	8	2.88	55	9.63	14	2.93	114	21.25	73	9.58	126	18.34	41	8.67
Total	277	100.00	570	100.00	479	100.00	537	100.00	762	100.00	688	100.00	473	100.00

which have made the most progress in improving their supplies are those who have supported the Bureau in its efforts for better milk, both by laboratory and field work, and the success attained is what might be expected from well directed and persistent effort. The results obtained from one day's sampling from one of these firms is not without interest. The specimens were procured at the cars on a very warm day in the latter part of July. Of twenty-seven samples only four had a temperature above 50 degrees Fahrenheit; the bacteriologic examination yielded results as follows:

Under 50,000 bacteria, 59.22 per cent; 50,000 to 100,000 bacteria, 18.52 per cent; 100,000 to 200,000 bacteria, 18.52 per cent; and 400,000 to 500,000 bacteria, 3.74 per cent.

One of the firms with a high percentage of specimens in excess of the standard is engaged in the sale of heated milk, and has not until recently examined its supply bacteriologically. After persistent efforts on the part of the Bureau, however, a laboratory was equipped and oversight of the milk brought here commenced. The field work of this firm is far below the expected efficiency. The other firm whose percentage of samples not complying with the standard is large does not deal in heated milk, but has begun active bacteriologic work, and has also organized a field corps for dairy inspection. From these or other efforts improvement must follow.

Chart I. shows the comparative bacteriologic standing of the contracting firms for 1905, 1906, 1907, 1908 and 1909, together with the percentage of infected milk from those concerns for the same years. The improvement in bacteriologic content is noticeable; there is also a distinct gain in the percentage of infected milk. There is one exception, however, in the latter respect, as from one firm, "E," 59.2 per cent of the infected milk from contractors was procured. Steps have been taken which will insure less of this debased product from the concern in question.

Marked progress has been made in reducing the number of wagon samples with high bacteria, and it is to be hoped, with improved methods and increased knowledge on the part of producers and milk handlers as to the harm which results when this food is improperly treated, that this betterment will continue. The handicap resulting from the present usage attendant upon the delivery of milk is difficult to surmount. There is not only the

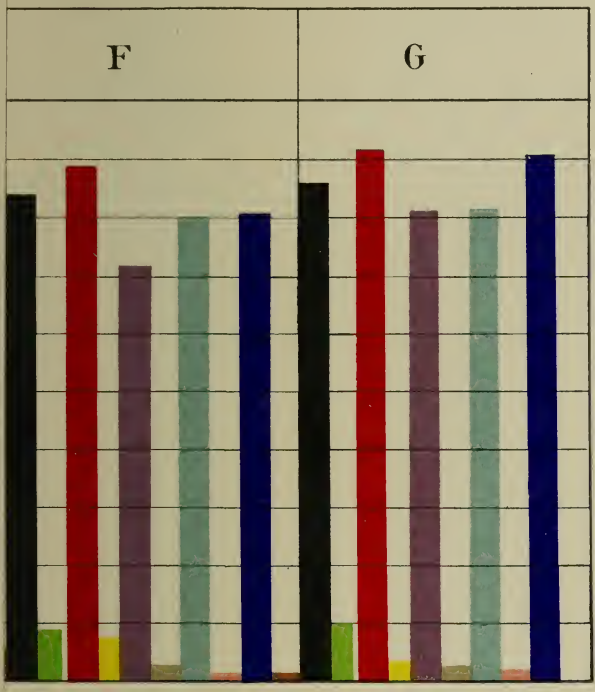
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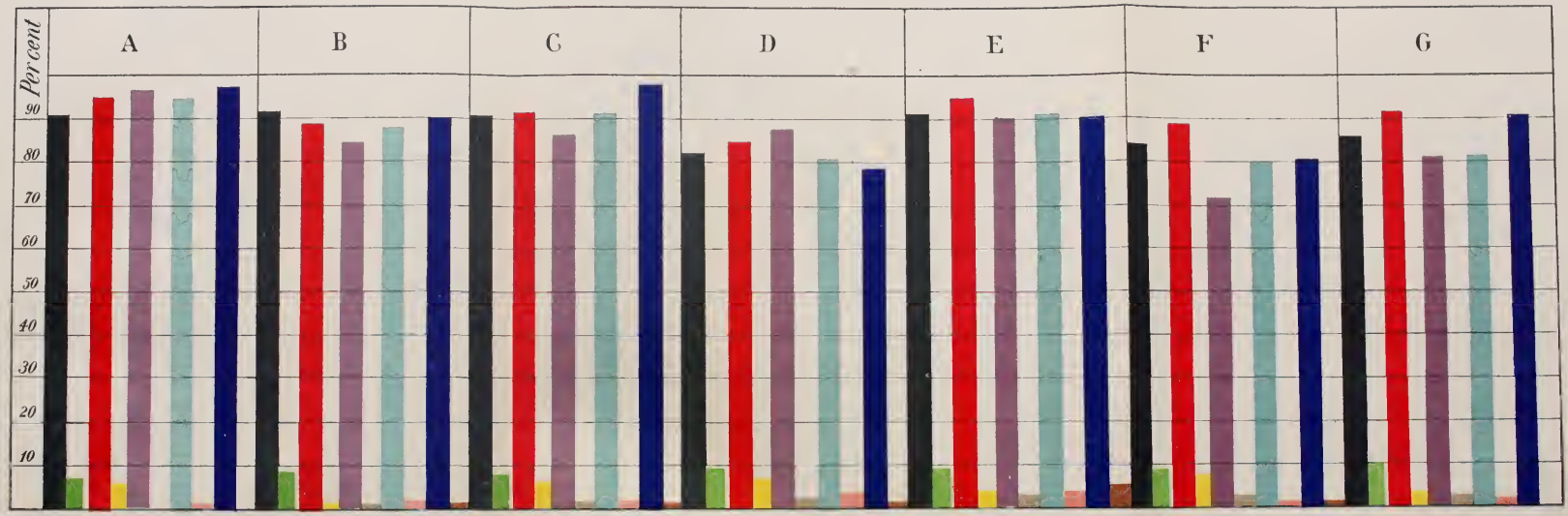
CHART No. 1

INDIVIDUAL CONTRACTORS' SAMPLES

1905-1906-1907-1908-1909

Percentages of specimens under 500,000 bacteria to the c. c., and of infected milk



Percentage of Milk under 500,000 bacteria, 1905
" " Infected Milk, 1905
" " Milk under 500,000 bacteria, 1906
" " Infected Milk, 1906
" " Milk under 500,000 bacteria, 1907
" " Infected Milk, 1907
" " Milk under 500,000 bacteria, 1908
" " Infected Milk, 1908
" " Milk under 500,000 bacteria, 1909
" " Infected Milk, 1909

risk from contamination from the mixing and bottling of milk, but it is furthermore stored by the dealer until the morning of the following day, when it is delivered to the consumer. Meanwhile from the practical basis there is usually an increase in bacterial content over that which the milk possessed when it was poured from the receptacle in which it arrived from the country. Despite this fact the milk may be in better condition when delivered than would have been the case had the milk been left with the consumer the day before and stored by him (as would have to be done with at least a portion of the supply) until the following day. From the practical standpoint of the consumer's interest the prevailing method of delivery may produce the best results, but from the basis of obtaining a wagon supply with a small number of bacteria it is an obstacle with which it is difficult to cope. Some idea of this increase in bacteria from the time samples are procured at the cars and from wagons (although the milk is not in many instances the same) may be gained by a comparison of Tables I. and III., and graphically by consulting Diagram I.

Table III.— Bacteriologic Examination of Milk Samples from Wagons.

Bacteria per Cubic Centimeter.	Number.	Per Cent.
Under 50,000	765	43.20
50,000 to 100,000	149	8.41
100,000 to 200,000	229	12.93
200,000 to 300,000	61	3.45
300,000 to 400,000	54	3.05
400,000 to 500,000	77	4.35
Total wagon samples under 500,000	**1,335**	**75.39**
500,000 to 600,000	84	4.74
600,000 to 1,000,000	156	8.81
1,000,000 to 3,000,000	143	8.07
3,000,000 to 5,000,000	25	1.41
5,000,000 to 10,000,000	20	1.13
Above 10,000,000	8	.45
Total wagon samples above 500,000	**436**	**24.61**
Total	**1,771**	**100.00**

The results from wagon sample examinations are shown by Table III. Of these, 75.39 per cent complied with the standard of the Board and 24.61 per cent exceeded the limit. The gain over the previous years in samples under 50,000 bacteria to the cubic centimeter is appreciable, the percentage for 1909 being 43 2; by

comparison with 1907, when only 22.44 per cent of these samples were obtained, some idea of the betterment may be gained. In 1909 64.54 per cent of these wagon specimens had less than 200,000 bacteria per cubic centimeter, the corresponding figure for 1908 being 61.01 per cent.

The question of containers for holding milk is of importance and one likely to occupy a more prominent part in the milk question in the near future. At present bottles and tin cans are employed exclusively and many cans are fitted with the objectionable wooden stoppers. These, despite the efforts of some firms to make them clean and sterile, are oftentimes in such condition as to contaminate the milk and depreciate its quality. Undoubtedly this stopper factor has much to do with the bacterial content of milk kept in cans. Experience indicates the superiority of bottles as containers for this fluid, and the findings of 1908 were duplicated by the results of the 1909 examinations. There was a slight gain, however, in 1909 in percentage of both the bottle milk and that taken from cans which complied with the standard for bacteria. Of the milk taken from bottles in 1909, 78.69 per cent contained less than 500,000 bacteria per cubic centimeter, while can samples complied with the standard to the extent of only 71.57 per cent. With heated milk the difference in favor of bottles as containers is more marked. This will be noted by Table IV., which follows:

Table IV.— Bacteriologic Examination of Pasteurized Milk from Wagons.

Bacteria per Cubic Centimeter.	Cans.		Bottles.	
	Number.	Per Cent.	Number.	Per Cent.
Under 50,000	75	35.55	62	59.05
50,000 to 100,000	23	10.90	10	9.52
100,000 to 200,000	37	17.54	13	12.38
200,000 to 300,000	11	5.21	.....	.....
300,000 to 400,000	5	2.37	7	6.67
400,000 to 500,000	10	4.74	4	3.81
Total samples under 500,000	**161**	**76.31**	**96**	**91.43**
500,000 to 600,000	17	8.06	2	1.91
600,000 to 1,000,000	16	7.58	1	.95
1,000,000 to 3,000,000	14	6.63	4	3.81
3,000,000 to 5,000,000	1	.47	1	.95
5,000,000 to 10,000,000	.....	.....	.....	.....
Above 10,000,000	2	.95	1	.95
Total samples above 500,000	**50**	**23.69**	**9**	**8.57**
Total	**211**	**100.00**	**105**	**100.00**

These findings denote that 91.43 per cent of the bottled milk had less than 500,000 bacteria per cubic centimeter, as against 76.31 per cent of the specimens procured from cans. The corresponding figures for 1908 were as follows:

Bottled milk complying with the bacterial standard, 91.49 per cent; samples taken from cans, 60.27 per cent.

In 1909, of the bottled milk conforming to the standard, 80.95 per cent of the specimens contained less than 200,000 bacteria to the cubic centimeter, and 14.21 per cent of the milk from cans contained from 600,000 to 3,000,000 bacteria per cubic centimeter. Although by comparison with 1908 the heated milk from cans in 1909 denoted a marked improvement, it is apparent that bottles only should be used as containers for milk thus treated.

From Table V. an idea of the quality of milk sold at shops can be gained; it shows considerable improvement over the store samples of 1908, but notwithstanding this fact store milk is of the poorest obtainable in this city. Regardless of the betterment in the character of store milk it should never be used excepting as a temporary expedient. Stores should not be relied upon as sources of supply, and users of this food should make arrangements to procure it directly from those who make a specialty of dealing in the product. A better, fresher and less manipulated supply is thus assured. Shop milk has all of the attendant drawbacks which accompany staleness and much handling.

Table V.— Bacteriologic Examination of Milk Samples from Stores.

Bacteria per Cubic Centimeter.	Number.	Per Cent.
Under 50,000	158	29.42
50,000 to 100,000	33	6.14
100,000 to 200,000	51	9.50
200,000 to 300,000	15	2.79
300,000 to 400,000	16	2.98
400,000 to 500,000	21	3.91
Total store samples under 500,000	**294**	**54.74**
500,000 to 600,000	53	9.87
600,000 to 1,000,000	67	12.48
1,000,000 to 3,000,000	90	16.76
3,000,000 to 5,000,000	21	3.91
5,000,000 to 10,000,000	6	1.12
Above 10,000,000	6	1.12
Total store samples above 500,000	**243**	**45.26**
Total	**537**	**100.00**

Every effort should be made to discourage the employment of shop milk for babies; in fact, it should never be used as a food for the young or those in ill health. Physicians will do well to exert their influence towards suppressing its present extended use. The practice of resorting to stores for milk is based on long established custom, but there can be little doubt that much of the harm resulting from the employment of this substance, when in an inferior condition, might be traced to this habit. The troubles following the use of shop milk usually fall upon those who can least afford it, for those in good circumstances procure their supplies elsewhere than at shops. It is essential for the public welfare that the sale of this commodity be surrounded with greater restrictions.

In all, 54.74 per cent of the shop milk complied with the standard of the Board of Health, while 45.26 per cent had bacteria in excess of 500,000 per cubic centimeter. The results for 1908 showed that only 43.41 per cent of the store milk was of the quality required by the regulation; in that year only 22.77 per cent of the samples had bacteria of 500,000 or less, while the corresponding figure for 1909 is 35.56 per cent. Thus it is seen that there is a decided improvement, and by comparison with the years when this work was first undertaken the gain is more pronounced.

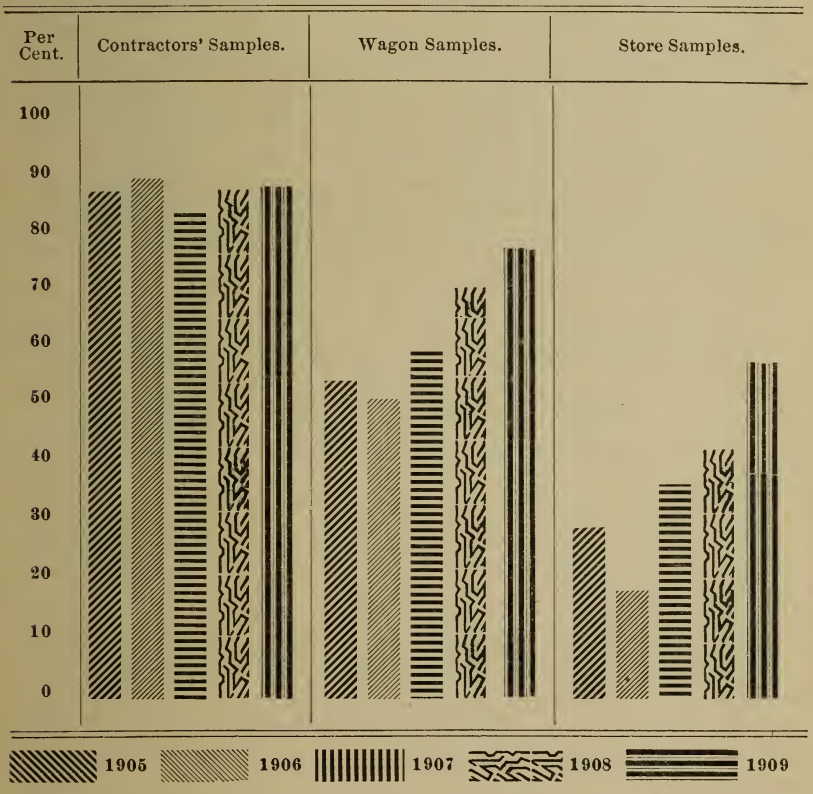
The examination of heated milk obtained in shops showed that only 49.31 per cent of the samples complied with the standard for bacteria, while 50.69 per cent had more than 500,000 bacteria to each cubic centimeter. The percentage of heated store milk which complied with the regulation is less than that of the total store milk. This condition coincides with that of 1907, but is the opposite of that of 1908. These facts indicate that the sale of heated milk in bulk in shops is not desirable. With bottles as containers it is hoped that better results may be obtained.

Regardless of the form of containers for either heated or raw shop milk, there are too many stores dealing in this commodity, and a considerable percentage of the owners of these establishments have no conception of the necessity for care in handling milk. To these latter milk is only merchandise, and in dealing in it their chief aim is to procure the price per quart demanded, while cleanliness and refrigeration remain minor factors and are usually given attention only at the instigation of the authorities. Manifestly it is essential to the suc-

cess of the clean milk movement to restrict its sale to those who appreciate the importance of the business in which they are engaged.

A large number of unclassified samples were also examined, in all 226, and 75.22 per cent of these complied with the requirement of the Board. A considerable proportion of these milks were brought to the office because the quality was supposed to be inferior. Very few were in sterile containers, and they had oftentimes been kept where the temperature was high. In view of these circumstances the large proportion of these milks of low bacterial content is remarkable.

The diagram which follows shows the comparative percentage of specimens from contractors, wagons and shops for 1905, 1906, 1907, 1908 and 1909 which complied with the bacterial standard of the Board.



The contractors' column shows the condition of the milk as it arrives from the country; the wagon and store

samples for the most part represent milk as it was being delivered or sold to consumers on the day following its receipt in this city.

The milk from all sources denotes improvement over the previous year.

The examinations of milk for bacterial content and for pus organisms were made in the bacteriological laboratory, under direction of Dr. Francis H. Slack.

Milk Contaminated with Pus and Streptococci.

It is gratifying to note the decrease in the samples of infected milk, and to record the fact that the number found is the lowest since the attempt at suppressing these abnormal specimens was inaugurated in 1905. Since this latter year the reduction has, with one exception (1908), been constant; in 1908 the results were slightly higher than those of the preceding year. Undoubtedly the figures for 1909 are below those of the average year, but with the desired oversight on the part of producers it is believed there could be further substantial reduction in the number of these samples.

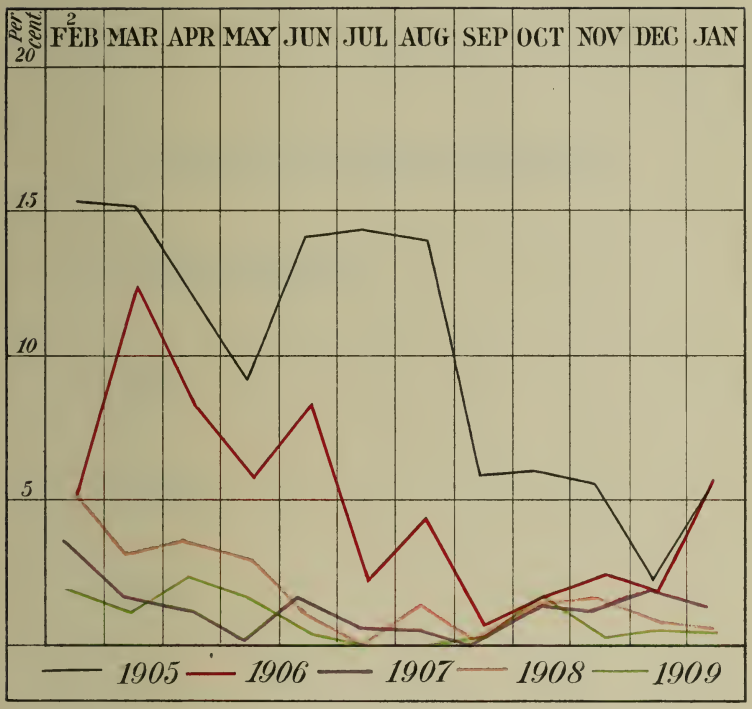
In 1909, 6,344 samples were examined for these organisms, and 58, or 0.91 per cent, were reported as infected. These results by months are shown in Table VI.

Table VI.

Month.	Total Samples Examined.	Number Containing Pus.	Number Containing Pus and Streptococci.	Per cent of Infected Milk.
February, 1909	621	10	2	1.9
March	773	6	4	1.3
April	541	13	.....	2.4
May	363	4	2	1.7
June	468	2	.....	0.4
July	379	.....	.....	.....
August	464	.....	.....	.....
September	533	1	.....	0.2
October	481	9	.....	1.8
November	521	.....	1	0.2
December	576	1	1	0.3
January, 1910	624	1	1	0.3
Total	6,344	47	11	

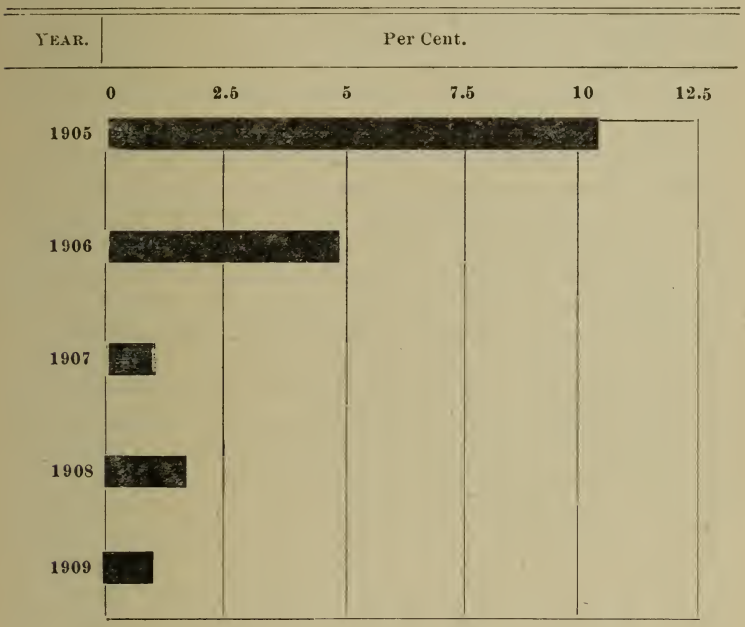
The comparative percentage of milk so infected for the years 1905, 1906, 1907, 1908 and 1909 is shown in the following diagram. During 1905, 5,559 samples

CHART No. 2



1. See Chart No. 1 for percentage of infected milk for 1905, 1906, 1907 1908 and 1909, from Contractors only.
2. The official year begins February 1.

were examined, and 583, or 10.48 per cent, were reported for their pus, pus and streptococci, or streptococci content. In 1906, of 5,007 samples, 246, or 4.9 per cent, were infected; in 1907, 4,609 specimens were examined and 52, or 1.1 per cent, showed infection; and in 1908, when 5,843 were tested, 107, or 1.83 per cent, were thus contaminated. The figures for 1909 have been given above.



The percentages of infected milk for 1905, 1906, 1907, 1908 and 1909 is shown comparatively by months in Chart II.

In July and August none of these abnormal samples were found; the examinations in July, 1908, also revealed no infected milk. With the exception of July and October, every month indicated an improvement over the corresponding months of 1908.

These findings indicate the marked improvement in the supply since 1905, when these investigations began, and the outcome is due to the plan enforced then, and since continued, whereby these objectionable specimens were excluded from the city. Had it not been for this attitude, it is doubtful if the present success would have been attained. This policy has been helpful in two ways

in bringing about this result. It has brought the attention of producers to the fact that they must be more discriminating in the kind of milk they send to this market, and it has enlisted the aid of the contractor, who has assisted by instituting and supporting laboratory supervision, in the reduction of the number of these infected samples. Thus these laboratories have oversight of the supplies of the different firms, and help both directly and indirectly in the annual betterment of the milk sold to consumers of this city. Credit is due those wholesalers who have been factors in this improvement, as the experiment has not been maintained without expense.

Producers who have been instrumental in protecting supplies from abnormal specimens are also to be commended, not only from the moral standpoint, but also from the fact that there has been a monetary loss from the milk not marketed. It is needful, however, that there should be more energetic aid from some of the contractors, and greater cooperation on the part of farmers is a further necessity. Decency requires that there should be a further reduction of the number of these infected samples, to the extent at least of excluding the product from all cows whose physical condition is such as to warrant the suspicion that the milk is not normal. Producers as a whole have never adopted this view, and there are still those who apparently believe that there is no reason to differentiate, for purposes of trade, between the milk from healthy and unhealthy cows. For slight gain they prefer to permit milk from animals whose abnormal condition is apparent to be marketed, unmindful of the possible influence of such an act upon the health of consumers. There is no doubt that this attitude on the part of some is wilful, and where this is the predominating characteristic criminal procedure would be mild punishment for the offenders. Other farmers are heedless of the physical condition of their stock, as was shown by one of the investigations last year following the finding of abnormal milk. In this case a cow owned by the farmer in question was found with an inflamed udder, and the owner disclaimed any knowledge of the fact. The contracting firm who had been purchasing the milk, however, held that it was his duty to know when his cows' udders were out of condition, and stopped purchasing milk from him.

There can be no doubt that there is further need for

more firmly fixing in the minds of producers the necessity of withholding this infected milk from that sent to market for human consumption. The subject is of such importance that no effort should be spared to adequately protect the consumer. The only manner by which this can be accomplished is by efficient oversight of stock at the farm by owners, accompanied by sufficient interest in humanity to be willing to assume whatever monetary loss is entailed whenever the condition of cows is such as to debase the milk. The duty of producers in this respect is beyond dispute. Consumers pay for, and they have a right to expect, this watchfulness on the part of those dealing in this product. That they have not received this oversight, or been accorded that honest treatment which is their due, is manifested by the investigations which have yearly followed the finding of this corrupt milk. These facts as to the condition of the animals have to be procured through local milkmen, and in the majority of instances it has been found impossible to obtain the desired data. Where information was secured, however, it has disclosed conditions which warrant the assumption that there is criminal negligence on the part of many farmers concerning apparent abnormalities in their cows. The reports of other years, coupled with the following information gleaned this year in tracing these infected specimens, amply support this contention:

1. Cow with garget in one teat.
2. Cows with garget; the dairyman sold the affected animals.
3. New milch cow. Veterinarian expressed the opinion that in a few days the milk would "be all right." Subsequent examination proved this prediction true.
4. One cow just being dried up; one cow with garget in two teats; one cow with garget in one teat.
5. Cow with garget in one-quarter of udder.
6. Drying up one cow.
7. Cow with one-quarter of udder badly inflamed.
8. Two cows being dried off.
9. Cow's teat injured by having been stepped upon.
10. One cow suffering with garget.
11. Cow with a swollen udder.

Efforts of Dealers to Improve Supplies.

At the present time all of the contracting firms have bacteriological laboratories for the examination of milk purchased from farmers. Two concerns began this

work in 1909 at the instigation of the Bureau, thus placing all of the companies on the same basis in respect to laboratory facilities. These firms tested in 1909 61,733 samples bacteriologically, which is an excess of 20,259 examinations over the previous year. Of these specimens, 768, or 1.24 per cent, were contaminated with pus or pus and streptococci. The percentage of this objectionable milk is slightly greater than in 1908; the figure for that year being 1.09 per cent. The bacteriologic examinations made by contractors have been increasing annually, and the above number is far in excess of that of any previous year.

Where milk was found to contain pus, or pus and streptococci, by these investigations, the product of the dairy was excluded by one firm, and samples from individual cows procured and tested, and the faulty cows eliminated before the supply was again purchased. Another concern has stopped seven dairies by reason of finding infected milk, and has made frequent re-examinations of dairies where the presence of diseased cattle was suspected. One company, on finding milk contaminated with pus organisms, insists on the isolation of infected animals, and the product from the non-infected animals of a herd is not received until the milk is shown to be satisfactory. The quarantine of infected cows is continued until examination of the milk proves the trouble to be eliminated. One firm, on finding abnormal milk, requests farmers to examine the udders of their cows and withhold the milk from those found diseased. The milk from individual cows is also examined, and in this manner the animals responsible for faulty milk are ascertained and their product kept out of the supply.

Where milk with high bacteria is found, one company sends warnings to dairymen; these are followed by letters of advice, and a lowered count usually results. In instances where no improvement was indicated, the purchase of the supply was stopped. Another firm holds dairymen to a count of 250,000 bacteria per cubic centimeter, and issues warnings where the count exceeds this figure or if the temperature is high. These are followed in a few days by examinations of the milk to ascertain if heed was given these admonitions. Other concerns send warnings where the milk has over 500,000 bacteria, and follow these by having their agents visit the dairy for the purpose of suggesting improvements

to the farmer. One of these latter firms, since the first of October, 1909, has been making to producers a discount of one cent per can where milk had over 500,000 bacteria.

Every company is of the opinion that these examinations and the subsequent efforts put forth have not only brought about a decided improvement, but that there was a marked gain in the quality of milk purchased in 1909 by comparison with the supply of 1908.

In 1909 the purchase of milk from many dairies was discontinued by the contracting firms upon their own volition. The causes assigned, while varied, all tend to improve the supply being brought here. One company excluded the milk from twelve dairies where frequent examinations showed persistent tampering. Another concern dropped twenty-nine dairies by reason of the milk containing excessive bacteria, or bad stable conditions existing at the dairy, or because of low standard. Nineteen dairies were stopped by one company, the milk having been found to be watered, skimmed, or produced under insanitary conditions. Ten dairies were quarantined because of infectious diseases, and five additional dairies dropped for insanitary conditions or for watering milk, by another firm. Lack of ice, objectionable methods and surroundings, skimming and adding water caused the dropping of several dairies by one company. The remaining concern which pursued this plan stopped purchasing milk from twelve dairies for unfavorable conditions and adulteration.

With many firms there has been a determined effort to better farm conditions in relation to milk supplies. There has been much inspection of barns, and issuing of pamphlets and circulars in the attempt to have sanitary methods followed. This has involved considerable expense, as some firms have kept two or three men engaged continuously in this work. One firm has built and equipped a bacteriological and chemical laboratory, and another has enlarged the quarters in which this work was carried on, and installed modern apparatus. One firm maintains a model farm which is an object lesson to dairymen. All of the cows at this farm are tuberculin tested animals, and the female calves are being raised under ideal conditions in clean, light and well ventilated stables. Premiums are allowed farmers where the fat in milk is above 3.60 per cent and the

bacterial content is low. This averaged over five cents above the usual price per $8\frac{1}{2}$-quart can during the year. Two firms employ automobiles in the work of dairy inspection, and one company caused the prosecution of five dairymen in an adjoining state for tampering with their milk. Another concern has prepared a set of lantern slides and a lecture to be used by country inspectors. These suggest methods for keeping milk clean and lessening the production cost. One company has instituted a medical supervision of employees during the year, and others investigate faulty conditions in the endeavor to obtain betterment.

While not as much effort has been made towards improvement as is desired and must follow in the future, it is true that the work of the year is far in excess of that of any like period, and was carried on at a considerable expense to the contracting firms. The procedure for handling the product in this city is constantly changing, as experience points to methods which yield better results. Many firms are earnestly endeavoring to give consumers good products and commendable service.

Dirt in Milk.

Milk, the food used by infants and invalids, and consumed in large quantities by those in good health, is the dirtiest substance employed as food by human beings. The filth with which it is contaminated is furthermore of the most disgusting and loathsome type, namely, cow dung. If other food materials were defiled with this substance people would never use them, but with milk fecal admixture appears to be accepted as a necessary accompaniment. As proof of this statement there have been occasions where objection has been made to milk free from cow dung on the ground that it was flavorless. This, while an actual condition, should beget repugnance for filthy milk and create a desire in those fond of this food to use it in the uncontaminated state.

Aside from æsthetic considerations, which are sufficient to require that milk be free from this and other forms of dirt, there are other and grave reasons why extreme cleanliness is necessary in the production and handling of good milk. As was pointed out in the report for 1908, and further demonstrated by other investigations, fæces from tuberculous cows are likely to

be impregnated with tubercle bacilli of the bovine type. Such cow dung falling into milk will contaminate the latter with this organism, and the use of this milk may prove dangerous to human beings. Furthermore, cow dung contains many bacteria, and the constituents of milk are favorable to bacterial development, so that circumscribing the sources of foreign material becomes a desirable essential.

Much of the dung which finds its way into milk comes from dirty, ill cared for animals, and drops into the pail during milking from the flanks, sides, tails, udders, or bellies of the cows. Other dirt finds its way into milk from the dirty hands of milkers, dirty clothing of attendants, and from unclean milk vessels. Dirty milk is a product of filth. To obtain good, clean milk, the opposite of the above conditions must be provided in every particular, and to maintain cleanliness at all times involves constant and persistent labor and attention.

A beginning was made during the year towards reducing the amount of dirty milk coming to this market. Samples were first procured, and the dirt contained in them collected by means of filtration upon cotton plugs. Where samples from dealers were found dirty, warnings were first given the offenders, but in cases where dirty milk was obtained from those who had been previously warned court complaints followed. These complaints were based on the statute which prohibits the addition of foreign substances to milk. To this contention there has been objection, the claim being advanced that the term "foreign substance," as intended by this law, was not broad enough to include dirt or matters found in milk not directly added through human agency for gain. A case is now pending in the Superior Court in which this is to be one of the contentions in the attempt to controvert the Government.

Samples were also procured at the cars and subjected to this test, and where they were found to be dirty, warnings were sent to the contractors, and these were later forwarded to the country to the producers responsible for this faulty condition. Where it was found that subsequent samples showed no improvement, the milk from these dairies has been ordered excluded from the city until those responsible for its condition improve their methods sufficiently to send reasonably clean milk to this city.

The form of warning notice employed follows:

HEALTH DEPARTMENT.— CITY OF BOSTON.

Bureau of Milk Inspection.

.....

You are hereby informed that the sample taken on.....

from a can from Dairy.....was examined and found to contain

Dirt.

There must be an immediate improvement in the condition of this milk if you desire to bring it to this city.

James O. Jordan,

To..... *Inspector of Milk.*

(See other side.)

[back.]

Much of the dirt found in milk comes from the cows, their surroundings, and from unclean milkers.

To produce clean milk, tie-ups should be free from dust, dirt and cobwebs, and dry fodder should not be fed to the cows just before milking.

The cows should be groomed daily, and manure, mud or other filth should not be allowed to remain upon their flanks, sides, tails, udders, or bellies. The clipping of long hairs from the udder and the right side of the cow is of assistance in preventing the collection of dirt, which may drop into milk. Wiping the udder with a damp cloth just before milking is also useful.

Milkers should be clean, and their hands should be thoroughly washed with soap and water and carefully dried on a clean towel before milking. The hands and teats should be kept dry during milking. Clean overalls and jumpers should be worn during milking; these garments should not be used for any other purpose, and when not in use should be kept in a clean place protected from dust.

Pails with small openings have been found advantageous in reducing the amount of dirt in milk.

The ideal clean milk method is not to permit any dirt to get into the milk.

This effort for cleaner milk has caused some of the contractors to cooperate with the Bureau in the endeavor for an improved supply. Two concerns have had many of their dairies equipped with pails having small openings at the top, and two firms have devised special

inexpensive filters, in which the milk is to be strained through absorbent cotton at the dairy. This method has the advantage of requiring fresh cotton for each milking, and eliminates the straining through cloth, which latter, by reason of ineffective cleaning, has often served as a source of contamination in milk. Two concerns are straining specimens of milk (in the manner described above) as it is sent in by farmers, and where filth is found the dried plugs of cotton are mailed to producers as an object lesson. These pieces of cotton are accompanied by explanatory circulars, which also treat of the methods by which the amount of dirt n milk may be greatly reduced. In addition to this, one contractor has already voluntarily excluded several dairies from which milk was being sent here contaminated with filth.

To accomplish lasting and the most beneficial results, however, contracting firms must attack this problem upon basic principles, *i. e.*, the efforts for improvement must be directed towards keeping dirt out of milk, and not to removing it by straining after it gets in.

Although this effort of the Bureau for the direct elimination of dirt in milk has only been in progress for a short time, material improvement is already indicated, not only in the samples taken from milkmen, but also, although in a lesser degree, in the milk as it arrives from the country.

Low Temperature Essential to Good Milk Supplies.

No city can have a good milk supply unless the temperature factor receives due consideration. Before the adoption of the regulations by the Board of Health limiting the number of bacteria in milk and the temperature to 50 degrees Fahrenheit but slight attention had been given to the subject of refrigeration. It is true that some ice was used in the extreme summer weather, but the main object for its employment was merely to aid in keeping the milk sufficiently sweet to avoid criticism from the consumer, and escape possible loss of business. With the advent of the above regulations, however, more vigilance was accorded this feature, and it was recognized that there were other and more important reasons for keeping milk cold than that of merely preventing souring before delivery to

customers. An endeavor was made to inculcate this idea into the minds of dealers, and, through the latter, to interest producers to equip their plants with ice for use in connection with the milk supply of this city. Some of the contractors entered into this work actively, and many farmers were induced to erect ice houses, and cut and store annually a supply of ice. The value of refrigeration was indicated to them, and thus the regulation of the Board became a workable force for good outside the limits of this city. Although each year sees more attention given this ice issue, and milk is being cooled better than ever before, it is a regrettable fact that progress in certain directions has not been as rapid as desired. A partial explanation of this condition is that not all of the contractors have been active in requiring producers to equip their dairies with ice and to use it. There are two reasons for this attitude. One is disregard of what constitutes proper milk production, and the other is unwillingness to insist upon improvements at farms, through fear of checking milk production, or that the producer will consider the demands excessive and endeavor to dispose of his supply to others less particular on the score of requirements. Possibly, also, the price received by farmers for their milk has been an element in retarding the use of ice at many dairies.

It follows, then, that some producers have not equipped their dairies with ice, and, although some of these latter are now using more care in cooling their milk than hitherto, they usually depend for results upon placing the cans of milk in well or spring water. This plan not only cools the milk slowly, but the temperature is never as low as when ice is employed. Thus during this inefficient and incomplete cooling there is more opportunity for bacterial development than where there is quick and thorough chilling by means of ice. Therefore there is consequent inferiority of product where the cooling is carried on after the former manner. The time is not far distant when dealers responsible for the purchase of milk from farms not properly equipped with ice and in other ways for the production of high-grade milk will suffer the consequences of their neglect and inattention to proper farm conditions.

It is no hardship to expect producers in this section to use ice for dairy purposes. A supply may be readily obtained, and it must be cut and stored at a period when

the demands upon a farmer's time are likely to be much less than at some other seasons of the year. Thus it may be procured at a minimum of inconvenience and expense. Consequently it is not unreasonable to expect every New England dairy to provide an ample supply of ice and use it liberally. If necessary, to make this condition possible, dealers ought to bear a just share of the financial burden by giving producers more compensation for their milk.

There is one feature which surrounds the handling of milk at some of these farms not equipped with ice which should be immediately checked, and that is the practice of cooling the milk by placing it in the water in watering troughs from which cattle and horses drink. The number of farms following this custom is not small. Where this plan is followed, the drippings from the animals' mouths may not only fall upon the stoppers and lips of the cans, but if the latter are not tightly stoppered the milk may be directly contaminated. A condition like the above is decidedly objectionable, and no contractor who permits such a state of affairs is dealing with his customers justly. Watering troughs, even where animals are not permitted to come in contact with the cans, are not proper places for cooling milk. The practice must be stopped at once.

The record for 1909 excels that of all other years from the standpoint of compliance with the temperature regulation as applied to the milk found upon wagons and in stores. It is true that the weather conditions were unusually favorable, but the principal factor was the employment of large quantities of ice. The temperature was ascertained of all of the milk procured in sampling during the warm weather, and, in addition to this, all of the specimens collected for bacteriologic examination throughout the year were tested for temperature. In this manner about 11,365 tests were made during the year. Of this number only 117 were sufficiently high to require the issuing of warnings; 76 of these notices were sent to milkmen for milk found upon their teams and to shopkeepers; the balance of the notices were mailed to contractors, and represented milk just as it arrived from the country. These latter warnings were subsequently forwarded by these wholesalers to the farmer from whose dairy the milk came. In the few instances where warnings failed to accomplish the

results desired prosecutions were instituted, but there were only nine such cases. Fines of $10 to $15 were imposed.

Condensed Milk.

The use of this type of milk has become so extensive as to warrant an investigation of the quality of some of the brands upon the market. The demand for condensed milk appears to be constantly increasing, and received a great impetus in 1907, when the price of whole milk was advanced throughout the city. This inquiry was commenced with a view of gaining an insight into the quality of some of these products, in order to determine whether or not their employment as substitutes for milk and cream is founded on economic principles, and also to ascertain if they are suitable for infant feeding. The claims made upon the labels of many of these specimens form an ample basis for study as to their value, when diluted with water according to directions, for subsequent use by both adults and the young. This research did not include all of the brands upon the market, but was confined to those which seemed to fairly represent the two types of condensed milk, namely, the sweetened and unsweetened varieties. The names of the brands examined, together with other information and the results of the analyses,* are given in the following table:

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* Methods.

The methods used in the chemical examination of the sweetened condensed milks were those given in the United States Department Agriculture, Bureau Chemistry Bulletin 107, pages 122 and 123, except that in the determination of protein by the Gunning method the factor 6.38 was used instead of 6.25.

In the chemical examination of unsweetened evaporated milks, the following methods were used:

Total solids	Bulletin 107, p. 123.
Ash	Bulletin 107, p. 123.
Milk sugar	Optical method.
Proteids	By difference.

Fat. — A special modification of the Babcock method, as follows:

Weigh 6 grams thoroughly mixed evaporated milk into a 10 per cent Babcock test bottle. Add ten cubic centimeters of water, and mix thoroughly. Add 17.5 cubic centimeters sulphuric acid (s. g. 1.81), and after mixing by rotation in the usual manner until all curd is apparently dissolved place the bottle with contents in boiling water for twenty minutes. Finally place test bottle with contents in centrifugal machine and finish as in regular Babcock method.

While these findings may be considered from various points of view, the fat content of condensed milk is of chief importance from the manufacturers' standpoint, for the reason that the commercial value of milk is calculated on a fat basis. Under these circumstances the use of low grade milk, *i. e.*, containing a small amount of fat, or a milk from which a portion of the fat has been removed (for cream or butter), will yield the manufacturer a higher profit than though a normal milk was employed. Thus the quality of milk used in these products is of interest to the consumer, and likely to be of financial advantage to the manufacturer. Unfortunately there is no method by which the exact amount of fat in the original milk may be determined. It is true, however, that calculations may be and are often employed to establish the quantity of fat in the milk before condensation, but at the best the results so obtained are only approximate. They are largely based upon the assumption that arbitrary factors (as those for milk solids, solids not fat, or ash), selected for calculation purposes, represent the original milk. By employing for such data, however, average factors close resemblance to the fat content may be attained. The calculations in the above table were to ascertain the degree of concentration and amount of fat in the milk used by the manufacturer. While the results obtained by use of the various factors are of interest, the averages are of chief importance, particularly in the closeness with which the average percentage of calculated fat agrees with the result obtained when 12.15 per cent (the legal percentage of milk solids in Massachusetts) is used in determining this fat value. It is believed that the figures from this latter method, and the averages above mentioned, represent nearly the quality of milk which entered into these products.

It will be observed that there is considerable variation in the percentage of fat in the condensed milk, as shown in Table A. In the sweetened samples the minimum amount is 6.45 per cent and the maximum 9 per cent, a difference of 2.55 per cent. In the unsweetened the difference is less, being 1.80 per cent, the minimum quantity being 7.20 per cent and the maximum 9 per cent. Thus this product is extremely variable as to composition, not only as between different brands, but specimens of the same brand are not constant as to fat content; a difference of 0.9 per cent of fat having

Table A.

Brand.	I. Analyses of Condensed Milk.											II. Degree of Condensation, Calculations Based on.					III. Calculated Fat in Original Milk.					Ratio of Protein to Fat.
	Price per Can, Cents.	Weight of Contents of Can, Grams.	Water.	Total Solids.	Cane Sugar.	Milk Solids.	Ash.	Protein (N x 6.38).	Milk Sugar.	Fat.	Fat in 12.15 Milk Solids.	0.64 per cent Ash.	8.5 per cent Solids not Fat.	8.9 per cent Solids not Fat.	9.3 per cent Solids not Fat.	Average.	0.64 per cent Ash.	8.5 per cent Solids not Fat.	8.9 per cent Solids not Fat.	9.3 per cent Solids not Fat.	Average.	
Challenge	11	372	29.30	70.70	37.11	33.59	1.50	7.88	15.66	8.55	3.09	3.73	4.68	4.48	4.28	4.24	3.64	2.90	3.03	3.17	3.20	0.92
Green Mountain	11	372	23.80	76.20	41.47	34.73	1.90	9.29	14.84	8.70	3.04	5.07	5.23	4.99	4.77	5.00	2.93	2.84	2.97	3.11	2.97	1.07
Summit	10	372	28.60	71.40	41.00	30.40	1.85	8.88	11.72	7.95	3.18	4.90	4.47	4.27	4.08	4.42	2.75	3.03	3.17	3.30	3.05	1.12
Cupid	10	337	24.10	75.90	45.32	30.58	1.54	8.55	14.04	6.45	2.56	4.40	5.19	4.96	4.75	4.82	2.69	2.27	2.38	2.48	2.45	1.32
Standard	11	403	25.80	74.20	41.63	32.57	1.75	8.37	13.60	8.85	3.30	4.69	4.78	4.57	4.37	4.60	3.23	3.17	3.32	3.47	3.30	0.95
Rose	12	410	27.65	72.35	38.76	33.59	1.58	7.83	15.18	9.00	3.27	4.04	4.73	4.52	4.32	4.40	3.64	3.11	3.26	3.41	3.34	0.87
Tip Top	12	412	27.20	72.80	38.78	34.02	1.40	8.18	15.44	9.00	3.22	3.58	4.81	4.59	4.39	4.34	4.11	3.06	3.20	3.35	3.39	0.91
Defiance	10	372	23.40	76.60	45.87	30.73	1.50	7.90	13.38	7.95	3.15	4.34	4.94	4.73	4.52	4.63	3.38	2.97	3.11	3.26	3.17	0.99
Eclipse	12	424	24.90	75.10	44.01	31.09	1.51	8.24	13.54	7.80	3.05	4.22	4.89	4.68	4.48	4.57	3.31	2.85	2.97	3.11	3.05	1.06
Red Cross	11	410	24.25	75.75	43.01	32.74	1.51	8.73	14.10	8.40	3.12	4.15	5.02	4.79	4.58	4.63	3.55	2.94	3.08	3.22	3.18	1.04
								By difference.														
St. Charles *	10	338	70.15	29.85	.....	29.85	1.40	8.80	10.95	8.70	3.55	2.19	2.49	2.37	2.27	2.33	3.97	3.49	3.67	3.83	3.74	1.01
Van Camp *	10	447	73.05	26.95	.....	26.95	1.50	8.30	9.80	7.35	3.32	2.34	2.31	2.21	2.11	2.25	3.14	3.18	3.33	3.48	3.27	1.13
Carnation *	5	180	75.60	24.40	.....	24.40	1.15	7.95	8.10	7.20	3.58	1.80	2.02	1.93	1.85	1.90	4.00	3.56	3.73	3.89	3.79	1.10
Carnation *	10	450	73.65	26.35	.....	26.35	1.25	7.90	9.10	8.10	3.75	1.96	2.15	2.05	1.96	2.03	4.13	3.77	3.95	4.13	3.99	0.98
Highland *	10	333	71.10	28.90	.....	28.90	1.30	9.00	9.60	9.00	3.79	2.03	2.34	2.24	2.14	2.19	4.43	3.85	4.02	4.21	4.11	1.00

* Unsweetened condensed milk.

been found in two samples of one make. These differences are further emphasized by the work of other investigators.

While it is not possible, as previously indicated, to determine the exact amount of fat in the original milk from which condensed milk is prepared, approximations show that in the preparation of some of the above specimens, either milk of abnormally low grade was used, or milk was employed from which a portion of the cream had first been removed. In any event it is significant that very few of the samples shown in the above table indicate that milk of high grade was employed in their manufacture.

Despite the fact that the exact composition of the milk prior to condensation cannot be ascertained, it is feasible to estimate the value of condensed milk when diluted with water for use by the consumer. This has been accomplished by determining the cost of a quart of standard milk (Massachusetts law) containing 3.35 per cent* of fat when made from these products by means of the addition of water. The weight, fat content and price of each brand was the data upon which these calculations were based.

The results appear in Table B.

Table B.

SHOWING THE COST OF A QUART OF STANDARD MILK CONTAINING 3.35 PER CENT OF FAT, WHEN MADE FROM CONDENSED MILK.

Brand.	Cost per Quart.	Brand.	Cost per Quart.
Green Mountain	11.1 cents	Van Camp	10 cents
Standard	10.1 cents	Summit	11.1 cents
Eclipse	11.9 cents	Tip Top	10.6 cents
Red Cross	10.4 cents	Rose	10.6 cents
Highland	10.9 cents	Challenge	11.4 cents
Carnation (5-cent can)	12.6 cents	Defiance	11.1 cents
Carnation (10-cent can)	9 cents	St. Charles	11.2 cents
Cupid	15.1 cents		

It is plainly apparent from these figures that the use of condensed milk is unwarranted, if motives of economy are to be considered. The cheapest milk when so pre-

* Much of the commercial milk has a fat content in excess of this amount.

pared, namely, that made from the Carnation brand, exceeds the price at which the householder usually purchases milk, nearly equals that of inspected milk, and the cost in all other instances exceeds the price of inspected milk, and with two brands the expense would be above that of certified milk. It follows then in practically every instance that the product made by diluting condensed milk is the most expensive which the consumer can purchase; furthermore, from another point of view, comparison with inspected and certified milk is still less favorable to diluted condensed milk, for the production of milk for condensing purposes is never attended with the precautions for care and cleanliness which characterizes inspected and certified milk dairies. Inspected and certified milk is also procured from tuberculin tested cows, which cannot be claimed for that used in condensaries.

Condensed milk has a limited legitimate field, for which it was originally intended, namely, that of supplying a product where fresh milk is not available. Other than this its use is attended with unnecessary and unwarranted expense to the purchaser. The energy involved in the preparation of condensed milk, the tin cans used for containers, the marketing and advertising are factors tending to make the diluted milk expensive, and for all of these items the consumer pays. Small wonder that the cost of a quart of such milk is large. Where fresh milk can be obtained, the employment of condensed milk as a substitute is a luxury.

All of the samples examined bore labels upon which appeared directions for diluting the contents. It was deemed of interest to ascertain the character of the product which resulted when these directions were followed. This data was calculated from the original analyses. For comparative purposes it should be borne in mind that the standard for milk in this state is not less than 12.15 per cent of milk solids and not less than 3.35 per cent of fat. The results follow.

Table C.— Composition of Mixtures of Condensed Milk and Water Prepared as Directed for Ordinary Use.

Brand.	Proportion of Milk to Water.	Water, Per Cent.	Milk Solids, Per Cent.	Fat, Per Cent.	Milk Sugar, Per Cent.	Cane Sugar, Per Cent.	Proteids, Per Cent.	Ash, Per Cent.
Sweetened.								
Summit	1 to 4	85.72	6.09	1.59	2.35	8.19	1.78	0.37
Summit	1 to 3	82.14	7.61	1.99	2.93	10.25	2.22	0.47
Tip Top	1 to 4	85.43	6.81	1.80	3.09	7.76	1.64	0.28
Tip Top	1 to 3	81.79	8.51	2.25	3.86	9.70	2.05	0.35
Rose	1 to 4	85.51	6.73	1.80	3.04	7.76	1.57	0.32
Rose	1 to 3	81.90	8.40	2.25	2.80	9.70	1.96	0.39
Challenge	1 to 4	85.85	6.72	1.71	3.13	7.43	1.58	0.30
Challenge	1 to 3	82.30	8.41	2.14	3.92	9.29	1.97	0.38
Defiance	1 to 4	84.66	6.15	1.59	2.68	9.19	1.58	0.30
Defiance	1 to 3	80.81	7.70	1.99	3.35	11.49	1.98	0.38
Green Mountain	1 to 4	84.76	6.95	1.74	2.97	8.29	1.86	0.38
Green Mountain	1 to 3	80.96	8.68	2.17	3.71	10.36	2.32	0.48
Standard	1 to 3	81.48	8.14	2.21	3.40	10.38	2.09	0.44
Eclipse	1 to 4	84.96	6.22	1.56	2.71	8.82	1.65	0.30
Eclipse	1 to 3	81.22	7.78	1.95	3.39	11.00	2.06	0.38
Red Cross (*a*)	1 to 1*	62.13	16.37	4.20	7.05	21.50	4.37	0.75
Red Cross	1 to 4	84.83	6.55	1.68	2.82	8.62	1.75	0.30
Cupid	1 to 4	84.80	6.12	1.29	2.81	9.08	1.71	0.31
Cupid	1 to 3	81.01	7.65	1.61	3.51	11.34	2.14	0.39
Unsweetened.								
Carnation:								
5-cent can	1 to 2	91.87	8.13	2.40	2.70	None	2.65	0.38
10-cent can	1 to 2	91.21	8.79	2.70	3.03	None	2.64	0.42
St. Charles (*b*)	1 to 1†	85.06	14.94	4.36	5.48	None	4.40	0.70
St. Charles	1 to 2†	90.05	9.95	2.90	3.65	None	2.93	0.47
St. Charles	1 to 3‡	92.53	7.47	2.18	2.74	None	2.20	0.35
Van Camp (*c*)	1 to 1	86.53	13.47	3.67	4.90	None	4.15	0.75
Van Camp	1 to 2	91.03	8.97	2.45	3.26	None	2.76	0.50

* "Cream." † "Rich Milk." ‡ "Economical Milk."
(*a*) 20.6 fluid ounces of this mixture would cost 11 cents.
(*b*) 22.4 fluid ounces of this mixture would cost 10 cents.
(*c*) 29.6 fluid ounces of this mixture would cost 10 cents.

It will be observed from the above figures that the product of these dilutions in all but three instances is of extremely poor quality, and not suitable to be characterized or used as milk. Those who prepare milk on the above basis are practicing self-deception. Each consumer who follows these labeled directions thus becomes a milk adulterator, and is using water with a degree of liberality which would astonish the most brazen of former old-time milk manipulators. With three exceptions, the value of these diluted products depends principally upon bulk; quality is a minor consideration. They are mostly rich in water, but in little of other milk constituents. More economy would follow and there would be no sacrifice of quality (eliminating the above exceptions) if to a quart of fresh average milk one-third to more than one quart of water was added. Products would result in nearly every instance which would equal the extremes of those which appear in the above table. With the three exceptions previously mentioned, where the products are diluted with an equal part of water, mixtures result containing more than the legal amount of fat, but their cost, considering the resulting volumes, would by comparison with the price of an equal bulk of milk be prohibitive. Sweetened condensed milk may be diluted to a greater extent than the unsweetened, without the difference in thinness becoming manifest, by reason of the "body" given the sweetened product by the added sugar.

It is largely upon the fraud basis, namely, the supposition that condensed milk could be diluted freely with water, and that the resulting mixtures possessed the approximate qualities of normal milk, that manufacturers of condensed milk have secured the present enormous and profitable business. The public has been deceived, and for this the manufacturers are responsible. The directions on the labels of some of these brands are general, while with others they are specific. One, the "Peerless,"* directs dilution with water to the required consistency for "purposes where ordinary milk or cream would be used." The sample of the condensed product examined contained only 8 per cent of fat, while the legal fat standard of cream in Massachusetts is 15 per cent. Even without dilution the Peerless brand would not be legal cream in this state. The label on the St. Charles brand states that the product

* The analysis of this brand does not appear in Table A.

has been "reduced to the consistency of cream." It contained only 8.70 per cent of fat, and the "rich milk" made by diluting this product according to directions would have contained fat as follows:

(1 of milk to 1 of water) = 3.98 per cent of fat; (1 of milk to 2 of water) = 2.65 per cent of fat, while the "economical milk" (1 of milk to 3 of water) = 1.99 per cent of fat.

The label of the Highland brand states that for certain uses "it may be slightly diluted with water, and for other purposes it may be further diluted to any desired consistence." The original contained 9 per cent of fat.

The label on the Red Cross brand states that "mixed with an equal quantity of water an excellent quality of cream is produced." A mixture so made would contain only 4.50 per cent of fat. The "rich milk" of this brand, prepared according to directions, would contain only 2.59 per cent of fat. Dilute "according to personal taste" with "one or two parts of water" is the recommendation on the label of the Van Camp brand. These mixtures would have contained fat respectively as follows:

(1 of milk and 1 of water) = 3.67 per cent of fat; (1 of milk and 2 of water) = 2.45 per cent of fat.

Thus statements not always characterized by truth find a conspicuous place upon the labels of many brands of condensed milk, and these claims are apparently valuable assets to the condensed milk business.

The most important feature of these preparations in their bearing upon the human economy is that of their employment for infant feeding. Directions for making dilutions for this purpose appear upon the labels of many brands. The fallacy of their use as nourishment for infants is shown in the following table, which indicates the proportion of the constituents of the different mixtures when made according to the printed formulæ. These percentages are calculated from the analyses of the undiluted milk, like those in the preceding table.

Table D.— Composition of Infant Foods when Prepared as Directed.

Brand.	Age of Infant.	Proportion of Milk to Water.	Water, Per Cent.	Milk Solids, Per Cent.	Fat, Per Cent.	Milk Sugar, Per Cent.	Cane Sugar, Per Cent.	Proteids, Per Cent.	Ash, Per Cent.
Highland*	1 week	1 to 16†	98.29	1.71	0.53	0.57	None	0.53	0.077
Highland*	10 to 12 months	10 to 36†	93.76	6.24	1.96	2.07	None	1.93	0.28
St. Charles*	1 month	1 to 7	96.26	3.74	1.09	1.37	None	1.10	0.18
St. Charles*	2 months	1 to 6	95.74	4.26	1.24	1.56	None	1.26	0.20
St. Charles*	1 year	1 to 3	92.54	7.46	2.17	2.74	None	2.20	0.35
Red Cross	1 month	1 to 13	94.60	2.33	0.60	1.01	3.07	0.62	0.10
Red Cross	2 months	1 to 11	93.69	2.73	0.70	1.18	3.58	0.73	0.12
Red Cross	3 months	1 to 10	93.12	2.97	0.76	1.28	3.91	0.79	0.14
Red Cross	6 months	1 to 9	92.43	3.27	0.84	1.41	4.30	0.87	0.15
Red Cross	1 year	1 to 6	89.17	4.68	1.20	2.02	6.15	1.25	0.21
Green Mountain	Use according to age and strength of child,	1 to 14	94.91	2.32	0.58	0.99	2.77	0.62	0.13
Green Mountain	Use according to age and strength of child,	1 to 8	91.53	3.86	0.97	1.65	4.61	1.03	0.21
Summit	Use according to age and strength of child,	1 to 14	95.24	2.02	0.53	0.78	2.74	0.59	0.12
Summit	Use according to age and strength of child,	1 to 8	92.06	3.38	0.88	1.30	4.56	0.99	0.21
Standard	New-born	1 to 16	95.64	1.91	0.52	0.80	2.45	0.49	0.10
Standard	New-born	1 to 14	95.05	2.18	0.59	0.91	2.77	0.56	0.12
Carnation*:									
5-cent can	Reduce according to age,	1 to 6	96.51	3.49	1.03	1.16	None	1.14	0.16
5-cent can	Reduce according to age,	1 to 4	95.12	4.88	1.44	1.62	None	1.59	0.23
10-cent can	Reduce according to age,	1 to 6	96.23	3.77	1.16	1.30	None	1.13	0.18
10-cent can	Reduce according to age,	1 to 4	94.73	5.27	1.62	1.82	None	1.58	0.25
Cupid	Use according to age and strength of child,	1 to 14	94.94	2.04	0.43	0.94	3.02	0.57	0.10
Cupid	Use according to age and strength of child,	1 to 8	91.57	3.40	0.72	1.56	5.03	0.95	0.17

* Unsweetened. † The addition of cane sugar is suggested by the printed directions.

Some of the brands make no claim of adaptability for infant feeding and are omitted from this classification, while others seek to foster the use of this substance. One, the Red Cross, under the caption "Important to Mothers," asserts that "Red Cross is prepared especially for infants. The most perfect substitute for mother's milk. Feed it to your babies and you will use no other. It possesses special nutritive qualities as a

food for children." The composition of these mixtures, as shown in the above table, presents a condition both condemnable and criminal. The manufacturers of condensed milk could not have advocated, even though it be by implication, their employment so diluted without being aware of the small amount of food value which they represented. Such a degree of culpability warrants the severest censure. The profit resulting from the sale of condensed milk for infant feeding on the basis of these labeled directions is iniquitous. Not one of these mixtures, even the most concentrated, represents the composition of normal milk during any period following childbirth. They rather imitate starvation diet. The employment of milk for an infant not a week old, containing .53 per cent of fat, .57 per cent of milk sugar, .53 per cent of proteids, and .077 per cent of ash, when human milk four to six days after childbirth * contains 2.97 per cent of fat, 6.47 per cent of milk sugar, 2.25 per cent of proteids, and .30 per cent of ash, is likely to be attended with disastrous results. This single example is sufficient to show the fallacy of these printed statements. There is the further disadvantage of the presence of cane sugar in these sweetened condensed milks, and in the formulæ of some of the unsweetened products the addition of cane sugar is recommended. This is important, in view of the fact that many physicians are of the opinion that this substance is to be avoided in infant feeding. Assuredly its employment should not be suggested by a manufacturer, even though it is essential to the financial success of his product.

There is another aspect of this condensed milk question not lacking in interest, namely, that of bacterial content. Undoubtedly this substance is supposed by laymen to be free from bacteria, and the printed matter upon some of the packages is not such as to disabuse the minds of consumers upon this point. The fact is that while a few of the brands were found to be sterile, with the majority there is no uniformity respecting bacterial content, and while one or more samples of a brand may be sterile, other packages of the same brand may contain large numbers of organisms. This condition was demonstrated by the examinations which were made. The brands found to contain bacteria appear in Table E, together with the maximum counts obtained.

* Carter & Richmond. "Dairy Chemistry," by Henry Droop Richmond, page 324.

Table E.* — Bacteriologic Examination of Condensed Milk.

Brand.	Bacteria per Cubic Centimeter.	Brand.	Bacteria per Cubic Centimeter.
Tip Top	200,000	Green Mountain	570,000
Defiance	520,000	Red Cross	560,000
Cupid	2,000	Challenge	10,000,000
Standard	900	Eclipse	280,000
Summit	17,500	Rose	850,000

* These examinations were made in the Bacteriological Laboratory of the Boston Board of Health, through the courtesy of the director, Dr. Francis H. Slack.

The following summary concerning condensed milk is submitted:

First. Condensed milk is seldom prepared from milk rich in fat. Analyses of several of the samples indicate that in a majority of the brands the original milk used was either of low grade in respect to percentage of fat, or that the milk had been skimmed.

Second. The present extensive employment of condensed milk is mainly due to the fact that consumers believe these products can be largely diluted with water, and yield a mixture which closely approximates the composition of milk. This opinion is fostered by the printed matter which appears upon the labels of the different brands. By following the definite and indefinite directions for water dilutions, mixtures impoverished in all milk constituents other than water are obtained, and the latter is present in excessive amounts, with the exception of the three brands before mentioned, and then only when dilution is with an equal bulk of water.

Third. If condensed milk is diluted with only enough water to make a quart of Massachusetts standard milk, *i. e.*, containing 3.35 per cent of fat, the cost of the latter exceeds the price of ordinary milk, and in some instances equals the price of inspected milk, and in others is more than that of some brands of certified milk. It follows that condensed milk cannot be employed economically where whole milk is procurable.

Fourth. Condensed milk is recommended by implication as a food for infants by those who manufacture it, and directions for dilution for this purpose appear upon the labels of most brands. Mixtures made according to the formulæ suggested would be deficient in practically every instance in percentage of milk constituents, as compared with human milk. Furthermore, they either contain, or the printed directions suggest, the addition of cane sugar, which substance is deemed an objec-

tionable ingredient of infant foods by many physicians. The employment of condensed milk for this purpose is no doubt often at the expense of infant life, and is to be vigorously condemned. The labels on these packages should bear a warning against the use of the contents as food for babies.

Fifth. The impression that most condensed milk is free from bacteria is not founded on fact.

Sixth. There is no justification in the use of misleading statements by the manufacturers of these substances. This should be prohibited by law.

Seventh. Packages of condensed milk should bear a formula for diluting with water, so that the resulting product shall not be below the Massachusetts standard for milk solids and fat.

Buttermilk.

The use of this product has reached large proportions and the demand is constantly increasing. The employment of this substance on the present scale is of recent origin, and although a by-product (even when made artificially) it has a large food value. Undoubtedly, however, many buttermilk drinkers use it for its supposed medicinal effect, rather than by reason of its nourishing qualities. More buttermilk is consumed during the hot weather than at any other time of the year; in fact difficulty was occasionally experienced in supplying the demand last summer. Buttermilk is distributed by leaving it at households, and also through the agency of hotels, restaurants, drug stores and liquor saloons; and a large proportion of it is delivered in bottles. Considerable buttermilk, however, is left by milkmen in cans.

Much of the product used here is true buttermilk, namely, that which results from the churning of cream into butter. When so prepared, it varies greatly, one day being suitable to trade demands and the next day just the reverse; for this reason it is an unsatisfactory product to handle. Some of the buttermilk, however, is prepared artificially from either skimmed milk or whole milk or mixtures of the two, and when so made is more readily controlled than is that which is the by-product of butter. Buttermilk is an unsatisfactory commodity from the milkman's standpoint, not only by reason of its great variability, but because, when free from all objection up to the time of delivery to consumers, it may quickly spoil after delivery to the latter, as very few families have facilities, or use the necessary

care, to keep it at the low temperature (less than 45 degrees Fahrenheit) essential to the checking of further souring.

When made from skimmed milk the latter is sometimes first pasteurized, and then there is added to it enough culture of lactic acid bacteria, called a "starter," to curdle the skimmed milk after several hours, the mixture being kept at a temperature of 70 degrees Fahrenheit. The mixture is next agitated by shaking, but usually by churning, to break up the curd clots into a smooth, thick liquid. Sometimes the product is next strained to remove any remaining large curd clots, and it is then ready to be placed in containers for delivery. It should be immediately cooled and kept at a temperature not higher than 45 degrees Fahrenheit until used. Some dealers add whole milk to the skimmed milk before it is curdled, and others claim that they add some whole milk or cream to the skimmed milk after souring.

Some dealers are frank enough to assert that they deal in and prepare buttermilk artificially, while others are evasive as to their methods and sources of supply. This latter attitude is absurd, for the skimmed milk buttermilk has all of the food value of the natural product and, as previously indicated, is likely to possess superiority in the important conditions of flavor and acidity.

In 1909 Bostonians used more than 1,616,287 quarts of buttermilk; probably the average daily consumption was about 5,000 quarts.

Cream.

The cream law, establishing a standard of 15 per cent of milk fat, is proving an efficient aid in protecting consumers from fraud in the sale of light cream. In the matter of heavy cream, however, there is frequently petty deception which accrues to the financial advantage of the dealer. Much of this heavy cream is sold as cream containing 40 per cent of fat, and not an inconsiderable proportion is deficient in fat from 1 to 5 per cent. Each per cent of fat taken from consumers, in every hundred pounds of this low grade cream, yields the dealer a profit of about 35 to 40 cents, depending upon the price of butter. Thus it is seen that if cream is robbed of from 3 to 5 per cent of its fat the

return to the dealer is more than fairly remunerative. This explains why dealers do not enthuse over the proposition to have a fat standard for heavy cream, but there is no other method by which the consumer and honest merchant can obtain protection. With the present state law as a minimum for fat content, cream richer in fat might well be required to be sold on a guaranteed fat basis, and to this stated amount dealers might be legally held. Such a plan would accord purchasers just treatment, and should be deemed equitable by dealers. It would eliminate both deception and unfair competition.

While this fraud in heavy cream cannot be checked at the present time, the existing law has been useful during the year in protecting consumers of the so-called light cream. This work disclosed the fact that much of the cream sold in restaurants was being systematically thinned. Many restaurateurs were in the habit of purchasing cream from milkmen which contained 15 per cent or more of fat, and to this, after delivery, was added an equal bulk of milk. This cream, when served to customers, was found to contain 7 to 10 per cent of fat, and when sold, as was often the case, in competition with standard cream, yielded an enormous profit. Many purchases of cream were made at restaurants, and where it was found deficient in fat, prosecutions were instituted. There were many more such cases than were ever brought previously in a single year, and it is anticipated that these actions will have a wholesome influence upon the quality of cream served in the future in the restaurants of this city.

While the bulk of the cream is produced without supervision from those who sell it in this city, it can be noted that there has been evidence during the year that a few dealers are devoting some attention to production conditions. From this beginning it is hoped that this oversight may be largely extended. One firm, which endeavors to secure good farm conditions for its milk supply, is now giving as much time to inspection of dairies from which its cream is drawn as is given to those where the firm's milk is procured. Another concern has induced some of the farmers with whom it deals to supply it with milk from cows found free from tuberculosis by means of the tuberculin test, and while the percentage of these animals is small by comparison with the total number of cows, a move-

ment of this character is one of the results of the agitation for improvement of the last few years. The farmers supplying this milk receive extra compensation from the firm in question. The cream from these herds is already on sale outside Boston, and can be supplied here as soon as there is a demand for it. The last named firm has sought to obtain better conditions at dairies in the way of cleanliness of cows, utensils, and barns, and the use of ice in cooling. An attempt has also been made to provide more rapid transportation for products, a bacteriological laboratory has been equipped and a bacteriologist employed. Much of the effort of this company for higher class cream has been made at the request of this Bureau.

Although in the last few years there has been a tremendous increase in the use of cream, there are indications that the demand reached the maximum in 1908. The business for 1909 showed no appreciable gain over that of the preceding year. This condition is partially accounted for by the economies which some consumers have had to make by reason of the recent era of high prices for all food products. A saving could well be effected in this direction from the fact that much cream has been employed as a luxury rather than as a food.

It will be advantageous to the milk supply if the demand for cream does not increase in the future as it has done prior to 1909, unless more attention is given to milk production in New England. The reason for this is that (as shown in the report for 1908) the equivalent of a large percentage of Boston's milk supply is now required for the production of the cream now consumed here. Based on the present milk production and the increase in milk consumption from constant gain in population in this and other cities, there can be no doubt that the future will see much of the milk used as such, which is now utilized for cream. With this condition, milk for cream purposes will have to be obtained from territory more remote than that now drawn upon.

Butter.

Although the amount of renovated butter sold in this city last year was much smaller than was annually handled here when this product first became an article of commerce, more of this compound was sold in 1909

than in 1908. This can be largely attributed to the prevailing high prices, which included butter as well as other commodities. More of this substance was also handled in tub form in 1909 than in the preceding year. Thus dealers did not have the partial protection attendant upon selling this butter in the pound wrapped and labeled packages, which has to a considerable extent in recent years displaced the tub form of this renovated article. It was pointed out in the report of last year, however, that if these wrapped and labeled packages were placed in unmarked outer wrappers when sold to purchasers, the law would be violated, as it is necessary that the outer wrapper bear the words "renovated butter" in one-half inch uncondensed gothic letters. Much renovated butter was used in restaurants and boarding houses in the latter months of last year, as it was somewhat cheaper than untreated butter.

Owing to the increased number of dealers selling renovated butter there were more cases than in 1908. Many of the storekeepers selling this substance made no pretence to mark it, even though it was purchased by them in marked tubs and they were aware of the provisions of the law. The majority of those who traffic in this substance, however, carefully observe the legal requirements. There were in 1909 seventeen cases for illegal selling.

Oleomargarine.

The high price of butter has had a tendency to increase the sales of oleomargarine, and it is believed this condition will not be without its influence in establishing a constant and increasing demand for this commodity. Unaided by the recent high prices for food-stuffs, this has been the tendency for the last three years, during which the number of registered sellers has rapidly increased. It is a fair inference that more dealers indicates that the number of users is growing. In 1905 there were eleven registered oleomargarine dealers; last year the number was sixty-one. Each year since 1906 has shown an increase in the number of dealers over the year which preceded it. This augmentation of dealers is also to be noted throughout the state. According to the reports of the Commissioner of Internal Revenue for the years ending June 30, 1908 and 1909, there were in Massachusetts dealers in oleomargarine as follows:

1908, 401 dealers; 1909, 469 dealers.

No doubt much of the retail business in oleomargarine has been developed by reason of the fact that manufacturers have advantage of the legal decision permitting the sale of oleomargarine having the appearance of yellow butter. But the trade is being established upon sound principles, and in most instances in accordance with the law. Under these circumstances the opposition to oleomargarine will be powerless, and if traffic in this commodity had been originally developed along present lines, much of the present restrictive legislation would have been a minus factor. Time will be required to undo the mistakes of former years.

Nearly all of the cases for violation of this law were for serving it at restaurants and boarding houses without notifying guests. In some of these places, where it was evident that oleomargarine was being used only when it was thought safe to serve it, heavy penalties were inflicted. During the year thirty of these cases were brought to the attention of the courts.

Vinegar.

During the year remedial legislation was attempted, which it was alleged would strengthen the present vinegar law. Two bills were presented in the Legislature, one of which aimed to establish additional standards for cider vinegar, and new standards for malt, syrup, molasses, sugar, glucose and wine vinegars. The other bill proposed a standard for syrup and molasses vinegars. These measures were offered by opposing vinegar interests, and at the hearings before the legislative committee they were supported to some extent, and also vigorously opposed, by vinegar dealers. A suspicion existed that the protection proposed by one of the bills was of the selfish variety, and was the result of a careful and practical study of cider vinegar manipulation from the manufacturer's standpoint. It was thought that this proposed measure would permit the manufacture of spurious cider vinegar and at the same time afford the skilled operator ample protection. With this difference of opinion in the vinegar trade, the committee before whom this question was heard very properly decided that no legislation was necessary.

The extensive manufacture of spurious cider vinegar, mention of which was made in the reports for 1907 and 1908, is still practised, and will continue to be as long as the demand for vinegar made from the apple exceeds

the supply, unless, meanwhile, some effective method of checking the work of these artistic adulterators is discovered. An effective method and one that will mean large economy to the consumer is to cease purchasing cider vinegar and buy white wine or spirit vinegar. This form of vinegar, furthermore, cannot be adulterated and is practically the only kind of vinegar which is sold pure. It is the least expensive type of vinegar obtainable, and none of the other forms are its superior in any way. Uncolored vinegars are indicative of purity; colored vinegars point to possible adulteration.

Practically all of the cases for the past year were for the sale of molasses, syrup, sugar and malt vinegars as and for cider vinegar. A few retailers are found annually practising these petty frauds whenever they think they can do so without fear of detection. They are willing to risk making these sales rather than lose the minute profit on a pint or a quart of vinegar. Other cases were for the sale or offering for sale of vinegar or cider vinegar deficient in acidity. In all, thirty cases were brought to the attention of the courts.

Court Cases.

A summary of the year's prosecutions follows:

For sale, or possession, or custody, with intent to sell, of milk not of good standard quality	246
For possession, with intent to sell, of milk containing added water	38
For possession, with intent to sell, of milk containing a foreign substance	3
For sale of cream containing less than 15 per cent milk fat,	44
For milk having a temperature higher than fifty degrees Fahrenheit	9
For failure to clean milk vessels as soon as emptied	58
For misuse of milk vessels	23
For improper testing of milk by tasting	9
For possession of unmarked skimmed milk, with intent to sell	1
For sale of milk, not being licensed	34
For sale of adulterated cider vinegar	3
For sale of adulterated vinegar	5
For sale of vinegar not made from cider as cider vinegar	22
For sale of renovated butter not properly marked	17
For sale of oleomargarine, not being licensed	1
For furnishing oleomargarine in a restaurant	30
	543

The results of prosecutions were as follows:

Number of warrants returned without service	3
Number of cases on file	57
Number of cases dismissed on motion of complainant	19
Number of cases nol prossed	2
Number of acquittals	8
Number of convictions	454
	543

INCOME.

The amount paid in fines was	$7,162 00
Receipts from license fees	2,513 00
Total	$9,675 00

Respectfully submitted,

JAMES O. JORDAN,
Inspector.

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